AUTOMOTIVE INDUSTRIES

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Commercial Aeronautics

Current *Automotive* Theme

Official conference at Washington this week follows annual aircraft show and S. A. E. meeting in Chicago.

Orville Wright

THE whole field of aeronautic progress, from the launching of the first heavier-than-air machine at Kitty Hawk, N. C., in 1902, down to the latest developments of the present day, is brought into sharp perspective by the events of national and international interest which have been divided between Chicago and Washington, D. C., this week and last.

Running concurrently in Chicago last week were the annual Society of Automotive Engineers' Aeronautical Meeting and the Chicago Aeronautical Exposition, the latter held under the auspices of the Aeronautical Chamber of Commerce. This week, at Washington, the Government is host to an International Civil Aeronautics Conference which is being attended by many foreign delegates and will be climaxed Monday, Dec. 17, by exercises at Kitty Hawk in commemoration of the twenty-fifth anniversary of the Wright brothers' first airplane flight.

Suggested by President Coolidge

This conference was suggested by President Coolidge as a fitting observance of the twenty-fifth anniversary of flight. Its purpose is to provide an opportunity for an exchange of views between the world's outstanding figures in aeronautics on the problems relating to the use of aircraft in world commerce. Among the famous figures in attendance is Orville Wright, who has been designated as the official guest of honor.

Of special interest to automotive men is a paper presented at the conference on "Automotive Engineering and Its Relation to Aeronautics," by Henry M. Crane, technical assistant to the president, General Motors Corp., in which Mr. Crane points out the very close parallel existing in research, general engineering design and production problems met with in the construction of all vehicles of this general type.

At the S.A.E. meeting in Chicago, powerplant design and developments, the problems of commercial airplane operation, airship construction and flight, and aeronautic standards were the leading subjects discussed. Unusual interest was manifested in the powerplant session and much discussion centered around a paper by Capt. L. M. Woolson, on the Packard Diesel-type aircraft engine, which has been mentioned previously in *Automotive Industries*.

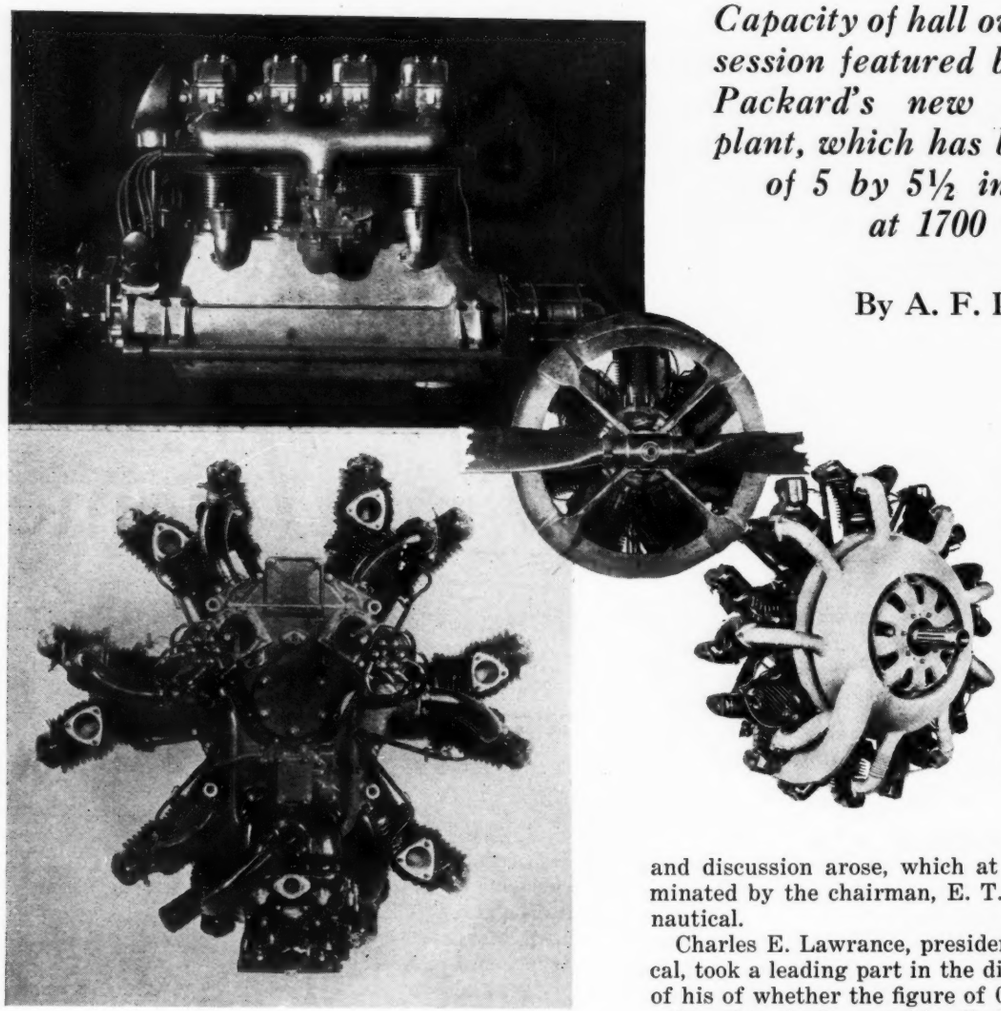
The growing importance of commercial aviation was emphasized by a paper on "Care of Passengers" at the session devoted to this phase of the industry. Adjustable seats, individual reading lights, hot and cold running water, buffet service and radio telephones are some of the conveniences now considered essential for airplane passenger services.

Numerous new engines and planes made their appearance at the Aeronautic Exposition, which proved to be the most comprehensive and interesting affair of its kind yet held in this country. The main features of this and the other events enumerated above are detailed on the following pages.

Interest High in Aircraft

Capacity of hall overtaxed during session featured by discussion of Packard's new Diesel power-plant, which has bore and stroke of 5 by 5½ in. and turns at 1700 r.p.m.

By A. F. Denham



These four engines were among the exhibits at the Chicago Aeronautic Show last week. Top—New 100 hp. four-cylinder air-cooled "Scorpion." Bottom—Rear of Curtiss "Challenger," showing accessories. Center — Century Rotary Motor Co.'s semi-Diesel type radial engine. Extreme right New Wright "Whirlwind" J-6 with power increased to 300 hp.

A DIESEL aircraft engine that is actually flying, air-cooled engines of the non-radial type, and maintenance of radial air-cooled engines in commercial operation—three subjects of the keenest interest at the present stage of development of the aircraft industry—brought out a crowd at the Powerplant Session of the S.A.E. Aeronautical Meeting in Chicago last week which overtaxed the meeting room facilities to such an extent that many had to listen from outside without being able to see the speakers.

The first subject was presented by Capt. L. M. Woolson of the Packard Motor Car Co., the second by S. D. Heron of the Material Division, Wright Field, and the third by Andrew Willgoos of Pratt & Whitney (in the absence of L. S. Hobbs of that company), and Edward Hubbard of Boeing Airplane Co.

Capt. Woolson gave no actual details of his new engine, aside from the fact that the bore and stroke are 5 by 5½ in., that it is running at around 1700 r.p.m. in service, that it weighs less than 3 lb. per hp. and has a fuel consumption minimum of 0.35 lb. per hp. He did, however, go into the principles on which the design was based and naturally a good deal of comment and discussion arose, which at the end had to be terminated by the chairman, E. T. Jones of Wright Aeronautical.

Charles E. Lawrance, president of Wright Aeronautical, took a leading part in the discussion. To a question of his of whether the figure of 0.35 lb. fuel consumption referred to single or multi-cylinder operation, Capt. Woolson replied that this was for the complete engine. Mr. Lawrance also asked whether any difficulty was experienced with synchronizing the individual fuel pumps for each cylinder, to which Capt. Woolson replied that this had not been one of their problems.

Mr. Jones stated that the fuel consumption of an air-cooled gasoline engine could also be brought down considerably if it were permissible to increase specific weight and use special fuels; that in fact specific fuel consumption in gasoline single cylinder engines practically as low as 0.35 had already been attained.

Starting Difficulty Overcome

To a question of Mr. Willgoos' on how the Diesel engine compared as to starting with slow-speed Diesels and gasoline engines, Capt. Woolson replied that it lies somewhere between the two. Capt. Woolson admitted that at first they had had some trouble with trapped air in the fuel lines but that this had been overcome by Professor Dorner, who is associated with Capt. Woolson in the development of this engine.

Proponents of water-cooled engines have always used as an argument against the radial that it has a much

Engines *at* S.A.E. Meeting

higher head resistance. In the last few years, however, considerable experimental work has been done in the way of developing reliable air-cooled, in-line or V-type engines, and these were made the subject of the paper by Mr. Heron. "The in-line engine is never likely to be as light as the radial unless extremely high rates of revolution become possible, and it is inevitably less compact in length," stated Mr. Heron. He added, however, that, "the line type offers the advantages of considerably smaller frontal area which probably will result in reduced drag and certainly gives better forward vision to the pilot."

The paper, profusely illustrated by slides of all types of in-line engines existing, and some projected or suggested, left but little for discussion. It was followed by Messrs. Hobbs and Hubbard's paper on radial engine maintenance. This paper was based on the experience of the Boeing Airplane Co., operating air lines between Chicago and San Francisco, and Seattle and Los Angeles, using Pratt & Whitney Wasps.

Chicago, scene of the S.A.E. Aeronautical Meeting, has become the most important airline terminal in the country. This view shows, in the extreme lower right-hand corner, the site of the city's new island airport, including accommodations for land or seaplanes and an inland "garage" (X) for seaplanes in case of severe storms

Conclusions reached are based on the operations of approximately 7000 miles per day. Mail was previously carried by Government planes with 400 hp. engines. In comparison the Wasps used saved about 500 lb. in powerplant weight, and carried twice the payload. The conclusions are summarized as follows:

For most satisfactory operation, the type of ship and its equipment must be selected and planned with full knowledge of conditions of operation.

High-Grade Fuel an Economy

The use of high-grade fuel is an economy in spite of higher cost.

Frequent oil changes or some suitable type of oil cleaner is desirable.

All temperature controls should be operated from the cockpit.

Careful routine checks should be made before and after each flight and at stated other periods.

Under severe service complete overhaul inspection about every 150 hours is more economical than longer operation periods.

For less severe or normal service 300 to 500 hours may be found more profitable.

The labor for complete overhaul of a radial is approximately 40 per cent that of a Liberty.

It is economy to remove the engine from the plane for overhaul.

Ultimate life of engines has not been determined, as the average time of service on Boeing lines is only about 1000 hours.

Experience is teaching the economy of reserve power in commercial operation, especially in relation to periods between overhaul.

In the discussion, Chairman Jones pointed out that when radial engines first came in, coincident with the beginning of commercial aviation, there was a good deal of engine trouble, attributable about 50-50 to manufacturers and operators, and chiefly due to ignorance of large scale commercial requirements, to which E. P. Warner, Assistant Secretary of the Navy for Aeronautics, added that not being an engine builder he felt he could say that they had nothing to apologize for. S. A. Moss of the General Electric Co. also pointed out the remarkable lengthening out of period between overhauls, which, according to this paper, was set at about 150 hours, as compared with 50 hours a few years ago.

Inevitably the point of relative automobile and aircraft engine life between overhauls came up. Mr. Warner answered this in one of the best ways we have heard yet. He said that comparisons should be made on the basis of percentage maximum efficiency of output maintained between overhaul periods.

W. G. Wall, president of the society, stated that one of the biggest aircraft engine maintenance problems at the present time was the lack of skilled general mechanics.

The best fuels for large-scale operations also came up for considerable discussion. Mr. Warner stated that operators should accept the best fuel as standard and then require engines to be designed for it, and also endeavor to make such a fuel more universally obtainable. This naturally brought up the question of specifying fuels. Mr. Heron stated that definite anti-knock rating specifications were available now if wanted, to which Mr. Willgoos replied, "Yes, but try to buy gasoline that way at the average flying field." Mr. Warner then suggested that the S.A.E. or some similar organization would do well to standardize on a Grade A and Grade B fuel, etc., perhaps on the basis of heptane-octane rating. H. C. Dickinson of the Bureau of Standards stated that the bureau was now working to get some standard method of rating. In his opinion heptane-octane rating might be used as a base but it could not at present be

applied quantitatively on more than a central laboratory scale. A secondary method of rating based on the primary standard would probably have to be made, he predicted.

Another interesting fact brought out during the discussion by Mr. Dickinson was that, of mechanical faults causing crashes or forced landings 70 per cent are attributable to the powerplant and of these a vast majority to the "plumbing" system.

Cowling of radial engines also came in for considerable discussion and it was suggested that manufacturers sell cowling with the engine to avoid some of the poor installations made by plane manufacturers or operators. To a question of what the Boeing company found the most economical percentage of throttle opening, as based on maintenance cost, Mr. Willgoos replied that this corresponded to about 60 to 65 per cent of maximum horsepower.

During the session, Otto Hermann of the Century Rotary Motor Co. stated that they had developed a 14-cylinder two-bank radial developing 360 hp., with a specific fuel consumption (gasoline) of around 0.30 lb. and a seven-cylinder radial of 180 hp. with a specific consumption of 0.28 lb. per hp. per hr. A photograph of this engine will be found on these pages. It is of the semi-Diesel type, according to Mr. Hermann.

Passenger Conveniences Discussed

Papers at Commercial Aviation Session also deal with costs of production and fog flying possibilities

FOUR papers were presented at the Commercial Aviation Session. The first, dealing with the "Relation of Production Costs to Quantity Produced," was presented by Lester C. Milburn of the Glenn L. Martin Co.; W. G. Herron of the Boeing Airplane Co. gave a talk on "Care of Passengers"; Lieut. A. F. Hegenberger of Wright Field discussed "Fog Flying Possibilities," and E. P. Lott of the National Air Transport analyzed commercial airplanes generally from a point of view of possible improvement.

Mr. Milburn's paper pointed out that a direct increase in production could not be translated directly beforehand to the basis of reduction in manufacturing costs as the relationship is not a smooth curve but rather one of stages. Steel tube fuselages were cited as an example where production cannot be measurably increased without substituting a large outlay for automatic welding machinery for hand welding.

Conveniences for Passengers

As some of the items related to passenger comfort and convenience which are now coming into use, Mr. Herron cited adjustable seats, individual reading lights, hot and cold running water, buffet service, rest rooms at flying fields and radio telephones. In the not far distant future, stated Mr. Herron, radio telephones will be made available to passengers for routine business calls, etc. There will also be developed overhead flying fields of a more accessible nature equipped with launching and quick stopping devices.

Leather seats should be provided with covers in warm weather, according to Mr. Herron. Better cabin heaters should be developed. Receptacles should be provided for newspapers and magazines, also ash-trays. In connection with airsickness, Mr. Herron stated that 10 per cent of all people subject to seasickness are also subject to the former. From this point of view dining service, until planes grow very much larger, should be provided at intermediate stops rather than in flight. Mail and passengers should not be carried in the same planes, especially in bad weather where it may become advisable not to carry passengers beyond a certain point, whereas mail must go through. Loading up should be near the waiting room, and a canopy covered concrete walk provided for this purpose.

Chairman W. C. Naylor of Stinson Aircraft said that there might be applied, as in the bus field, seats of different design for different distances of travel, the longer the flight the more comfortable the seat, and the more room per passenger. In relation to passenger location in the plane and seating arrangement, Mr. Naylor stated that the Junkers company in Germany is building a ship with 148-ft. wing spread, powered by eight engines, with the passengers located in the leading edge of the wings, side by side with good visibility through the transparent leading edge.

In his paper on fog flying possibilities, Lieut. Hegenberger brought out the following facts:

1. There is considerable difference in penetrability between water fogs and smoke fogs.
2. Fog penetration is greatest by radio waves.
3. Neon light has good penetration in water fog but not in smoke fog.
4. Suggested methods of fog dispersion appear impracticable.
5. Slotted wings and similar aerodynamic devices are helpful for landing in fog by relieving the pilot of some of his duties.

Lieut. Hegenberger also described and stated the advantages of the different kinds of instruments used at present or under development to supplant the pilot's sense of equilibrium, whether by sight, ear pressure, or muscular sense, in fog flying.

Of the various points brought out by Mr. Lott in his paper entitled "A Critique of Airplanes," might be mentioned his statement that there is no excuse now for lack of inherent stability, both lateral and longitudinal, within at least a 10 per cent range. Mr. Lott also stated that wood and fabric construction were easier to repair but required oftener servicing than metallic construction.

Adjustable Pilot's Seat

Pilot's seats should be adjustable fore and aft at least 4 in. and up and down at least 3 in., not only for comfort but for easier landing when greater visibility downward is required. Pilot's cockpits should also be provided with better heaters, and these compartments should be painted black for night flying with radiolited instruments, or a rheostat-controlled variable instrument illumination, according to Mr. Lott. He also stated that some work on windshields was

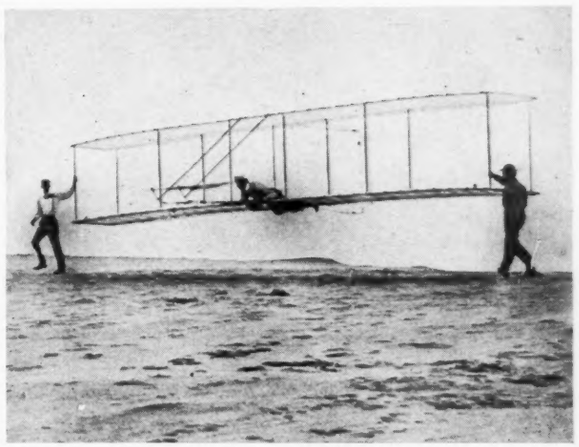
necessary, possibly some compromise between celluloid and glass, the former not affording good enough visibility and laminated glass due to its weight being apt to injure the pilot in case of a crash.

Whether the pilot should be located fore or aft is still a much debated question, according to Mr. Lott, who stated that the forward position provided better visibility for normal flying and landing while the second might be safer in case of a crash. Brakes are one of the most useful of accessories for airplanes, Mr. Lott said, chiefly from a taxiing angle. Further suggestions which he made included the provision of greater arcs of travel for the tail skid or stronger tail construction, or provision of a tail wheel. The latter, however, should be provided with a locking mechanism. Cowling of powerplants should be made more easily removable, possibly by hinging on one side and providing automobile type hood latches on the other. Push and pull rod controls should be substituted in all cases for wire cables. For better accessibility and loadings, steps should be provided in the fuselage for mechanics and sidewalks on the wings. Rings should be attached to tails for easier handling by tractors on the ground.

Fokker Defends Wood Wings

Opening the discussion, A. H. G. Fokker of Atlantic Aircraft objected to the statement that wood wings require more servicing than metal. He said he believed that commercial operation experience was not broad enough to warrant drawing any such conclusions at the present time. With regards to fore or aft location of the pilot, Mr. Fokker said, "I can build any kind of plane, with the pilot forward, aft, or in the middle, but I can't build one where he can see 360 deg. all around," and that a compromise would have to be made. He added that in most cases desirability of some type of construction or other was based on a whim, without any foundation in fact.

Mr. Fokker stated that improvements in pilot's windshields were probably as important a necessity as anything at present. J. S. Skorning asked whether it would not be possible to arrange the cowling and shape the plane design in such a manner that the slip stream would deflect snow and ice away from the windshield over the pilot's head. Mr. Fokker also questioned the desirability of providing windows which could be opened by the passengers, stating that with the air velocity available it should be possible to build in the most perfect ventilating system possible. Mr. Lott replied to this that the problem was probably largely psychological and that possibly a pullman-type window would be the answer, "one that looks as if it could be opened, but can't."



A true appreciation of the progress that has been made in aeronautics in the last 25 years is awakened by this picture of a Wright glider, taken at Kitty Hawk, N. C., in 1902. The knowledge of aerodynamics thus gained led to the first successful airplane flight a year later

Dirigible Developments Reviewed

Resume of lighter-than-air achievements during 1928 given by Dr. Arnstein. New ship now building is described.

JUDGING from the attendance at the Lighter-Than-Air Session which closed the S.A.E. aeronautical week program, there has been a widespread revival of interest in this method of transportation in this country. A large number of foreign aircraft representatives who are in this country for the International Aeronautical Conference in Washington were guests at this session. Present also were Assistant Secretaries Warner and McCracken of the Navy and Department of Commerce.

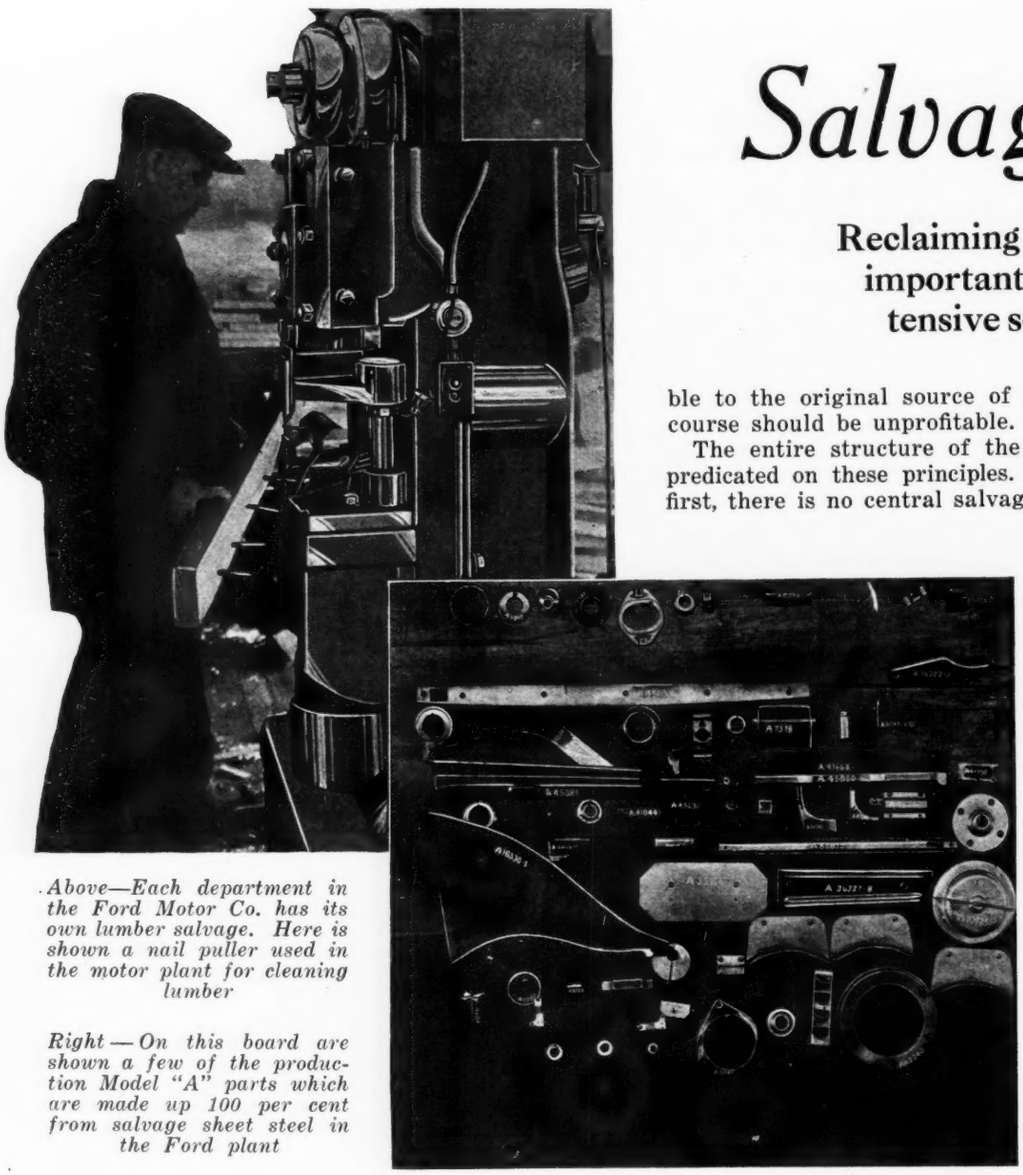
A highly interesting resume of lighter-than-air developments during 1928 and a forecast for 1929 was presented with profuse illustrations by Dr. Carl Arnstein of the Goodyear-Zeppelin Corp. Of the various high points during 1928, Dr. Arnstein cited the crossing of the Graf-Zeppelin, initiation of the Zeppelin building program by the Goodyear-Zeppelin Corp., approaching completion of the British 5,000,000 cu. ft. ship, construction of the world's largest dirigible hangar at Akron, Ohio, and beginning by the Goodyear company of a fleet of non-rigid dirigibles for commercial use.

Dr. Arnstein also gave a detailed description of the 6,500,000 cu. ft. ship under construction at the Goodyear plant. It is to have a dead load of 210,000 lb., and inflated with helium a useful load of 193,000 lb. Due to the use of helium it is possible to place the motors inside the hull, thus reducing drag resistance and increasing accessibility. Drive to the propellers is through a clutch to adjustable bevel gears, by means of which the propellers can be set to any angle from horizontal to vertical for easier maneuvering in landing. Another feature of the powerplant installation is a counterflow exhaust gas cooler, the cooling air being piped through the ship for heating purposes. The use of helium also permits the retraction of the passenger compartment to within the hull, a desirable feature from

(Continued on page 872)

Salvaging is

Reclaiming of waste in auto important economies. Ford tensive scale from mines to



Above—Each department in the Ford Motor Co. has its own lumber salvage. Here is shown a nail puller used in the motor plant for cleaning lumber

Right — On this board are shown a few of the production Model "A" parts which are made up 100 per cent from salvage sheet steel in the Ford plant

PROBABLY in no other single industrial organization does the problem of profitable salvage play as important a part as with the Ford Motor Co. The salvage departments form a vital unit of the economic structure of that company.

The various salvaging units extend from the coal mines to the shipping department and offices. Although all contribute their measure toward enabling the production of cars and trucks at low prices, discussion here will be confined mainly to those salvaging operations which are related directly to the manufacture of automobiles and which are or may be reproduced in other automotive plants in the country.

Before going into details it might be well to state some of the underlying principles on which all Ford salvaging operations are based. These are:

First—The salvage departments operate in such a manner as to force the departments from which salvage materials are obtained to make as much use of these materials as possible.

Second—To find applications for salvaged materials within the Ford organization.

Third—That all salvage raw materials not usable within the Ford organization be sold wherever possible to the original source of supply, unless such a course should be unprofitable.

The entire structure of the salvage operations is predicated on these principles. In order to apply the first, there is no central salvaging division, except in so far as general control is concerned. Practically each department has its own salvage shop and salvage inspectors. Only such materials as are not usable within that department are transferred to central salvage control for redisposal. In this manner bookkeeping is simplified. All Ford production parts, for instance, are given a cost price and it is up to the departments in charge of the production of these parts to bring the cost down to the correct point. To emphasize the necessity of keeping materials or parts going to salvage down to a minimum, the salvage value of such materials is not credited to the department in question, but is deducted from general overhead.

Starting with the steel rolling mills, trimmings from steel billets, or "back-scrap" are returned directly to the open hearth furnaces, as is other steel scrap. Consequently steel going through the open hearth contains a high percentage of scrap steel, usually in the neighborhood of 50 per cent or slightly less. Of this amount about 40 per cent (20 per cent of the total) is back-scrap from the rolling and trimming mills. Machine shop or production scrap is also returned either to cupola or open hearth, scrap of each type of steel being kept separate, as a matter of necessity. Moreover, as stated, no parts are accepted for the steel plant which have not been scrapped by final salvage inspection as being worthless for production purposes.

Red and yellow metal scrap is handled similarly except that it has to be pigged before reusing, to prevent porosity of subsequently produced batches. Red and yellow metal scrap represents about 25 per cent of the total amount of metal of this type produced by the Ford plant daily. Moreover, this type of scrap is also divided into grades, there being 25 grades in all.

Increasing Factory Profits

motive plants producing many operations carried out on ex-

shipping rooms and offices.

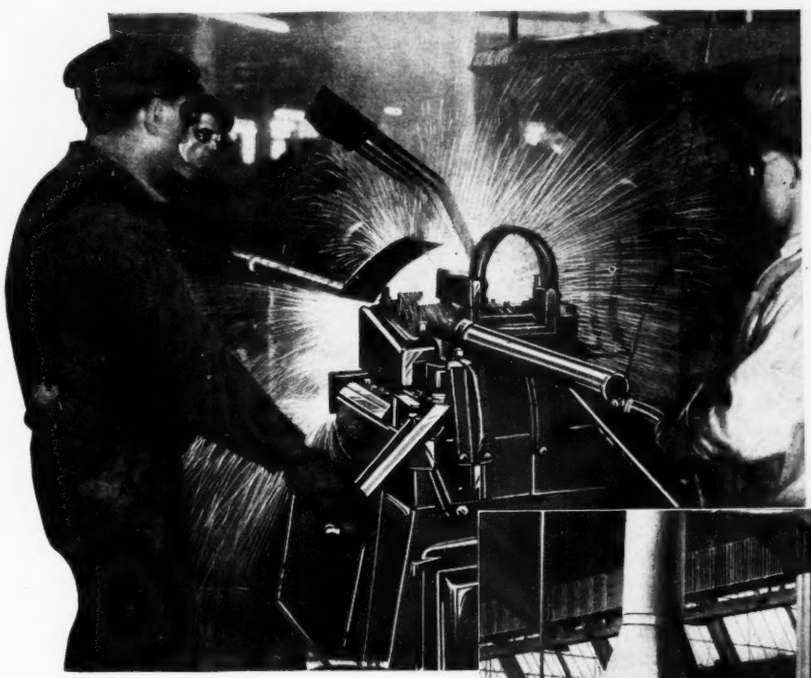
High-grade scrap of this kind occasionally does not require pigging, especially in the case of defective forgings or castings. Occasionally scrap yellow and red metal is also sold to prevent overstocking if not needed at the time.

In order to simplify the handling of salvage white metal, all production bearings have been made of the same analysis. White metal of other analyses, such as that obtained from machine tool bearings, etc., is pigged and stamped and brought to the correct analysis by the addition of the necessary tin, antimony, etc.

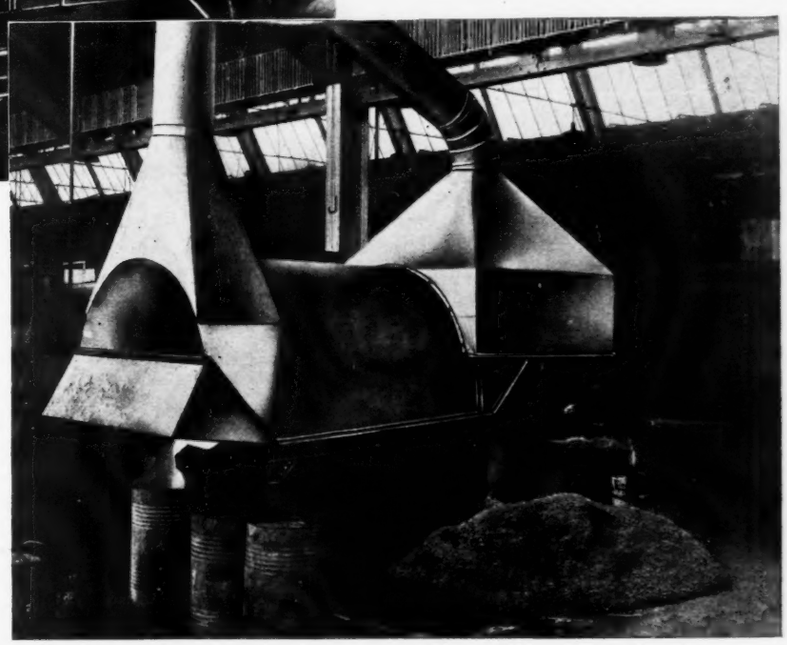
Since Lynite pistons are used in the Model A, there is a considerable amount of aluminum available for scrap, roughly in the neighborhood of 20 oz. per car, or 5 oz. per piston, in addition to production scrap. Such scrap is pigged and supplied to the die-casting department at the Highland Park plant. Surplus scrap is sold, preferably to the original supplier of the unfinished parts.

Lumber scrap is derived from a number of sources and finds wide application within the Ford organization. Each departmental receiving room cleans its own lumber and turns it over to the shipping room of that department. In the motors building, where the largest amount of lumber is received with shipments of parts, etc., a number of saws and automatic nail extractors are used to clean the wood and cut it to standard shipping sizes for reuse in the same building. Close-by branches of the Ford Motor Co. also ship lumber back whenever such a course is shown to be economical. This applies especially to special shapes and sizes used generally. When no longer usable for shipping purposes the lumber is turned over to the box factory which, except for export boxes, operates entirely on salvage lumber. In this manner 40 per cent of all lumber used daily is obtained from salvage, representing about 125,000 board feet for the Fordson plant alone, with 30,000 ft. from the Highland Park plant.

Fire bricks are widely used. The salvage department reconditions all such bricks up to half-brick sizes



Left—Short pieces of piping are not scrapped, but are welded together to form standard lengths in a machine built especially for this purpose in the miscellaneous salvage department at the Fordson plant. Piping is then returned to stock for reuse



Right—This gravity oil extractor for aluminum borings, installed in Ford's Highland Park plant, replaced six centrifugal driers used for this purpose. After cleaning, this scrap is pigged for reuse

for relining furnaces. Smaller sizes are crushed to make gannister for lining of pouring ladles, etc. Such lining is obtained 100 per cent from salvage, no fire clay being bought. Electrodes from electric furnaces are also crushed up for graphite to be used with the gannister for such lining.

The salvage department exerts a rigid control over purchases of non-productive materials. Such materials are reclaimed wherever possible and returned to stock. No stock clerk is allowed to issue a purchase order for such materials unless the order is stamped "Salvage cannot supply." Such materials include lumber, canvas, rope, hose, cable, pipe covering, upholstering cloth (non-productive), etc.

Scrap Cloth is Sold

Scrap cloth in small sizes is sorted according to size and material in relation to the available open market resale possibilities. For instance, small pieces of a certain size might find a good market for manufacturers of score pads, etc.

Rubbish and cardboard are separated from all paper scrap and the paper baled and sent to the Ford paper mills in quantities of about 14 tons daily. Cardboard is cut up mechanically into standard sizes and used between polished parts in shipping. About 20,000 pieces of cardboard for this purpose are obtained daily in this manner. Cardboard trimmings are baled and sold separately.

Tools, when worn out for the particular job for which they are intended, are reworked, often as high as eight or 10 times, according to a definite program, and returned to tool stock by salvage. High speed tools when too small to enable further reworking are used for the production of high-speed steel at the Ford plant.

In the salvaging of plug gages, chrome plating is often used to bring gages up to size, but it has been found that this method is not always economical and in many cases they are cut down to the next smaller size in preference.

Mop pails are not purchased but are made up of five-gallon paint tins in quantities of about 100 per day. Belting when turned over to salvage is reconditioned wherever possible. If not it is cut down into smaller sizes. Belting scraps are made into pads which are used between the radiator and frame in the Model "A," together with brake lining scrap.

Belting is Replaced

In connection with belting it is also of interest that all plant maintenance men or millwrights do not effect repairs unless these can be made on the spot, but substitute new units and return those replaced to the salvage department which reconditions them and places them in stock for further use. This does not apply to such parts as electric motors, which are repaired separately by the electrical department, but does apply to such parts as switches, sockets, chain links, belting, etc.

Standard pipe fittings are cleaned by millwrights and returned to stock during changes in pipe fitting. Special fittings go to the salvage department for reconditioning before reverting to the stockroom. Piping is also turned over to salvage by millwrights. It is reconditioned, or made up into shorter standard lengths. Smaller pipe pieces are allowed to accumulate and when a sufficient stock is at hand they are welded into standard lengths by a special operation and returned to stock in 100 per cent condition.

With regard to production parts, the salvage inspector has the final say as to whether parts should or should not be scrapped. If the salvage inspector approves the part it is stamped with a special marking and goes back on the production conveyor line and has to be used. If the part is rejected it is marked with paint and scrapped.

In the pressed steel division the salvage department plays an especially important function in relation to production materials. Scrap from large press operations is used wherever possible for the manufacture of smaller pressed-steel parts. In one section of the pressed steel division there is a group of over 70 presses alone, operating entirely from sheet steel supplied by the salvage department. Such sheet steel as is absolutely unusable is baled in hydraulic metal balers and returned to the foundries or open hearth, according to type of steel. In the pressed steel division also are found several instances where production parts have been changed in design so as to enable use of otherwise scrap steel. Such changes in design are always based on the fundamental that a saving must be shown.

A separate division of the salvaging organization, a miscellaneous reconditioning department, is also maintained. In this department all parts which cannot be handled economically by routine methods are checked over for possible reuse and reconditioning. Here, for instance, is equipment for vulcanizing rubber boots and hose, retapping nuts, rethreading bolts and assembling mates, etc. Such parts are put into 100 per cent stock condition and returned for use in the department from which they came.

Containers Reconditioned

On goods purchased from outside manufacturers which passed initial inspection, the salvage department can, if it considers it justified, return the parts to receiving inspection, from where they are returned to the manufacturers for credit. Returnable containers also come under the jurisdiction of the salvage division. Some of these, such as large wire reels, acid bottles, crates, etc., are reconditioned by the salvage division concerned, if necessary, before returning them to the source of supply for credit. Several thousand containers are handled thus every day. A considerable saving is effected, since many suppliers will not accept for credit damaged containers.

Machinery itself is not accepted by the salvage department unless such a transfer is approved by the engineering department. Machine tools which have outlived their usefulness in certain operations are turned over to other departments in which high limits of accuracy, etc., are not as essential. Machine tools received by salvage therefore are generally in such shape as to preclude complete reconditioning. They are then either sold or, if no market can be found for them, they are dismantled and the good parts are turned into machine stock, unusable parts going to the cupola after a spark test to determine the kind of steel. Shafting, if it cannot be reconditioned, is used for bar steel. The statement regarding machinery is applicable to anything which has a book value, all of which must be accompanied by a work order before it is accepted by salvage.

There is also a definite relation between the salvage and service departments. When the design of certain parts is altered a service stock is of course created, generally an estimated five-year bank. At the end of each year this stock is checked and surplus is turned over to salvage either for dismantling or reuse as the case may be.

Just Among Ourselves

Oakland Inaugurates "Talkie" Campaign

OAKLAND is another automobile company to adopt the movietone as a part of its 1928-1929 sales program. An Oakland "talkie" has just been started on the road to a number of dealer meetings, A. R. Glancy the Oakland president and W. R. Tracy, general sales manager, being the featured stars. Mr. Glancy gives a talk on the new Pontiac line, while, Mr. Tracy outlines Oakland sales program for the coming year.

* * *

Several Factories Reduce Discounts

DEALER discounts have been lowered by several manufacturers in recent months, a fact not nearly so significant nor important as might appear on first glance. Within certain general ranges, dealer discounts don't mean a whole lot in these days when allowances made for used cars play so important a part in a large majority of the new car sales made. In some instances, of course, the new car discount is so set as to permit the dealer to allow a bit more for the prospect's used car than the dealer thinks it is worth; in a majority of cases today, however, the discount is coming to be about the actual margin on which the dealer is expected to be able to do business and make a profit. Certainly this latter principle would seem sound for the industry as a whole in the long run. Any system of trading allowances or inside discounts tends basically to confuse the merchandising scheme and upset the soundness of merchandising practice. The bargain sales on old models prior to the announcement of new lines indulged in by several manufacturers this year can be counted a definite step forward in the clearing of the atmosphere; it is to be hoped that it will become a regular part of the marketing practice of the industry.

* * *

Competitive Creed Worth Remembering

IN the face of growing competition between American and foreign makers for the automotive markets of the world, a restatement of the fundamental competitive creed of the American automobile manufacturer, made the other day by John N. Willys, is thoroughly timely. Speaking as chairman of the N.A.C.C. foreign trade committee, Mr. Willys said: "We are coming to realize increasingly that the major task of the motor industry is to stimulate the use of motor transportation, to reduce the cost of transportation to the consumer and to promote world-wide employment of the automobile as a general utility. As these aims are progressively achieved, the markets for all types of motor transportation will increase and benefit all manufacturers, regardless of nationality." So say we all.

* * *

Fresh Appreciation of Cabell's Methods

WHILE we are a bit avaricious in our reading, we aren't prone to spend much time with the technical sides either of literature or language. In fact we almost had to switch our major subject away from English in college because graduation involved a course concerned almost entirely with the technique of language and not at all with the sequence or meaning of the ideas expressed in that language .... Be that as it may, we did get some new feelings and new ideas, the other day, out of an almost purely technical book of limited edition called "Cabellian Harmonics." We have read most of Cabell and thought we got a good deal out of him; we did, but by this analysis of his work we were set off on a different train of thought. We got some real idea of how very painstakingly and very carefully and in how thoroughly planned a way Cabell has labored to so complete a work as to enable it to produce or express certain emotions and reactions.

* * *

Similar Methods Needed in Business

IT isn't important that we should have learned what was done to produce these particular reactions in this particular case; the fact that they were produced was sufficient to us as a reader. It would seem important, however, to all of us, that we recognize more fully the need of thorough objectiveness in nearly all of our business activities particularly from an executive or a sales standpoint. Too often we become intent in our business life on trying to impress our associates with the carefulness and marvelousness of our technique, losing, meanwhile, the chance of having that technique influence them as it was designed to do. We in our own subjectiveness, in other words, directed their attention to the trees instead of permitting them to visualize merely the woods .... All of which is put very confusedly, but it means something to us and we had pleasure in writing it .... so, "your pardon, please" and we'll try to do better next time.—N.G.S.

New *Six*-Wheel Numerous at

Development due to legal re load of four-wheelers. important development.

By Edwin P.

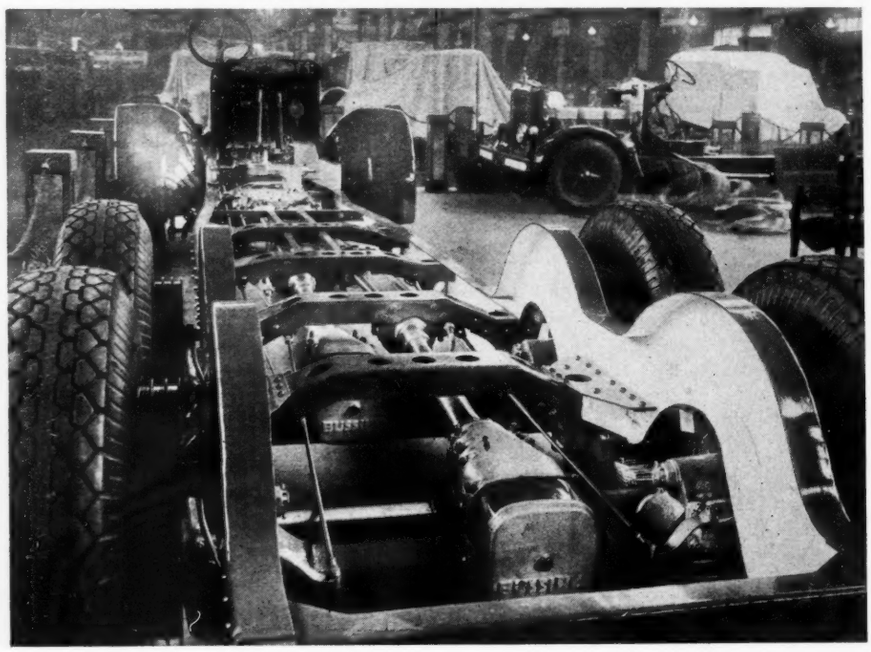
FROM a technical point of view the commercial vehicle section of the Berlin show was much more interesting this year than the passenger-car section; for whereas the latter reflected chiefly an endeavor to catch up with progress made elsewhere, there was evidence of much meritorious pioneer work in the commercial car section.

The chief developments disclosed were in connection with six-wheeled vehicles and forms of independent springing. While there is nothing basically new in six-wheeled vehicles, the first practical design of this kind having been evolved in this country 10 years ago, six-wheeled design is still in a state of development, and German engineers have worked out numerous new and interesting applications of the principle.

Independent springing of road wheels has had a good deal of attention in Europe in recent years, but chiefly on the part of independent inventors or little-known firms, and as applied to passenger cars, and this was undoubtedly the first time that several heavy vehicles embodying this feature were exhibited by well-established manufacturers. Three different types of construction were represented, characterized respectively by cross springs taking the place of supporting axles, axle tubes pivoted to a frame-mounted driving-gear housing, and stub axles in the form of cranks with bearings on the frame.

THE outstanding features of the commercial car section of the Berlin automobile show were the large number of new six-wheeled chassis for trucks and buses and the almost total absence of 5-tonners. The reasons for these developments in Germany are to be sought in legal restrictions which limit the weight of completely loaded four-wheeled vehicles to 9 metric tons. With the adoption of starters and generators; of heavier, more powerful engines, and of other refinements, the net weight of trucks and buses has increased considerably, and the permissible pay load has proportionately decreased.

Buessing, six years ago, led the way in Germany by placing on the market a six-wheeled chassis which made it possible to increase the pay load by 5 tons. It is hoped that the weight restriction will be eliminated in the near future, especially in view of the fact that the use of cushion and pneumatic tires has been made compulsory. That, of course, would be a thing in favor of the less expensive four-wheeler, but in the meantime six-wheel development is being hailed in Germany as reducing the wear and tear on roads and adding to the comfort of bus passengers.



Buessing six-wheel low frame bus chassis with final reduction by spur gears at wheel hubs

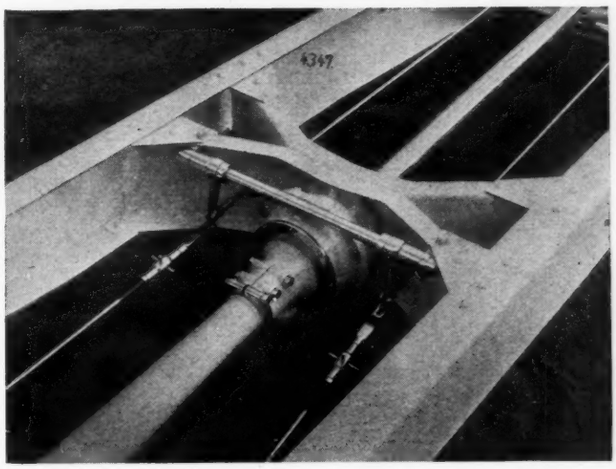
Before going into details it is perhaps worth while to say a word relating to the general trend of design. Only a few foreign makers exhibited in this section of the show, and they did not offer anything out of the ordinary, hence we can confine ourselves to the German exhibits. In German commercial vehicles, the same as in German passenger cars, an increase in horsepower and the general adoption of six-cylinder engines are noticeable. Whereas, formerly, engines with from 60 to 80 hp. were considered sufficient for the heaviest work, we now find vehicles with from 120 to 160 hp. Buessing, Vomag and others already use 160 hp. engines, and chassis with engines of 100 to 120 hp. are common even among the four-wheeled type.

Unit powerplants are the rule. Dry two-plate and multi-plate clutches are being preferred in new designs, although cone

German Trucks *Berlin Show*

strictions which limit pay
Independent springing is
Engines are larger.

A. Heinze



Frame detail of Mercedes-Benz six-wheeler

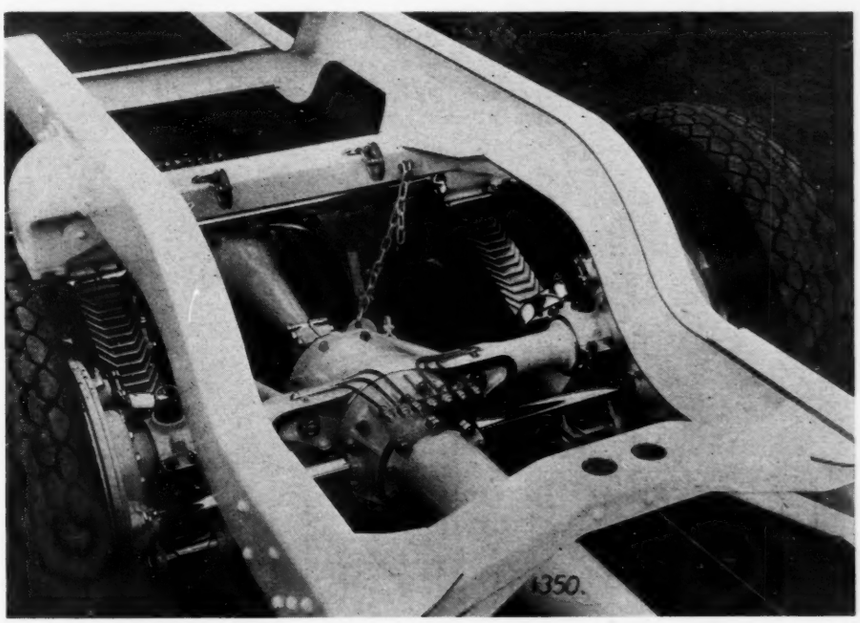
clutches are still numerous in older models. All engines are fitted with electric starters and generators, and mostly also with air and oil cleaners. Magneto ignition is retained in the great majority of models. Oil-pressure brakes are appearing in larger numbers, often in combination with a Bosch-Dewandre vacuum servo. The Knorr air brakes are also making progress, and are used in chassis meant to work with trailers—a combination now also frequently met with in Germany in long-distance interurban coach services. The use of the engine as a brake by shifting the camshaft and bringing a new set of cams into play, is now the practice of three makers, Buessing, Henschel and MAN.

Conventional spring shackles are on the decline. The ends of semi-elliptic springs often slide on wear plates, or else they are fitted with rubber shock insulators. Rubber is being increasingly used also for engine mountings and in spring bushings. Metal and fabric universal joints are used with nearly equal frequency. Grease gun lubrication is retained, but measures are being taken to simplify the work of chassis lubrication by grouping the nipples in accessible places. Centralized lubrication systems, however, are also met with. Owing to the length of most of the heavy chassis, propeller shafts are generally divided.

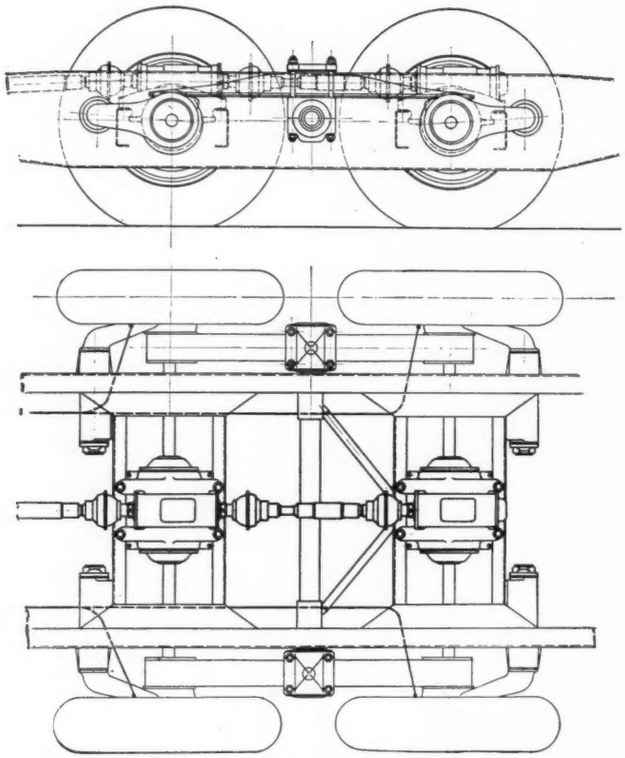
Chassis frames are in all cases of deep channel-section. The longitudinal members are straight as seen from the top, but are dropped immediately behind the engine and have kick-ups over the rear axles. The final drive and rear axle forms in German chassis are very varied, and interesting new methods are adopted in some cases. Worm drive is gaining ground, as is also the use of spur reduction gears at the hubs, which has now been adopted also by Buessing and Daag, the older users being Daimler-Benz and MAN. Maybach overspeed gearboxes are extensively employed on the new models.

The most interesting German six-wheelers are doubtless those with divided axles and independently sprung wheels. The unsprung weight in these chassis is very low, and their riding qualities are correspondingly good. A novel form of drive has been introduced by Durkopp, the chassis of which has a total length of 32½ ft. A six-cylinder 100 hp. engine is combined with a multiplate dry clutch and a four-speed gearbox into a unit powerplant. The propeller shaft consists of two sections connected by fabric joints to short connecting shafts running in bearings on cross-members of the frame. A third section carries a bevel-type differential.

The side gears of this differential, which are loose on the propeller shaft, are fixed to spur gears also running loose. The forward spur gear meshes with a similar gear on a short parallel shaft on the right, and the rear spur gear with a similar one on the left, so there is a differential action between the two parallel shafts, the ends of which carry worms meshing with worm wheels. From the worm wheels, axle shafts extend to the driving wheels, incased in housings that



Rear construction of Mercedes-Benz six-wheeler with final drive through spur gear at wheel hubs. Note grouped oil gun fittings



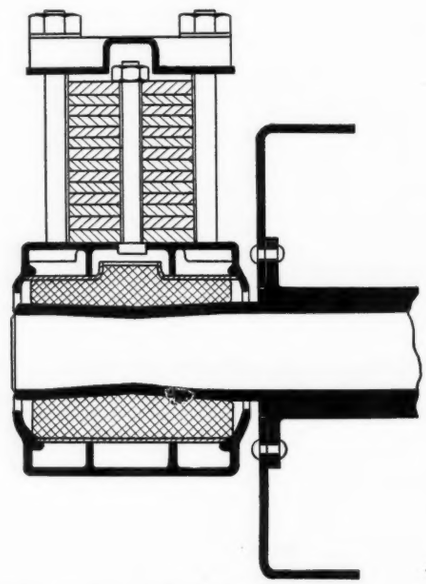
Rear construction of Hansa-Lloyd six-wheeler with independently-sprung driving wheels on cranked stub-axles

are pivoted concentric with the driving worms, so the axle shafts can swing up and down independently. Thus the two road wheels on each side are driven through a common shaft in the differential assembly, and are connected to the wheels on the opposite side through the single differential gear, which is supported on the frame and transmits the propulsive force. The wheels on each side support the chassis through a semi-elliptic spring with a swivel mounting to the frame at its center. Six-wheel vacuum-operated service brakes are provided, and in addition there is a hand brake on the transmission. Cast-steel wheels shod with 40 x 10.5 in. low-pressure tires are employed, and the chassis, which weighs about 10,600 lb., has a body space 27 ft. long.

A feature of the engine is that failures in the force feed lubrication system are indicated immediately by the lighting up of a small electric bulb on the instrument board. The chief advantages of this chassis are undoubtedly the use of a single, very compact differential assembly, and the very small unsprung weight.

Hansa-Lloyd also introduced a novel six-wheeler, which has an over-all length of 26 ft. 9 in. It is capable of carrying 5 tons or a bus body seating 30 persons, with standing room for 10 more. A six-cylinder engine of 396 cu. in. displacement and developing 80 hp. is employed. It is combined with the clutch and four-speed gearbox and has a three-point rubber mounting on the frame. A Maybach overspeed gear is included in the transmission, being located behind the normal gearbox, Each of the four rear wheels is carried by one end of a massive crank, the other end of which is supported in a long bearing in the frame side member, which at this point has a very deep section. Inside the frame the bearing lies adjacent to a cross-member, from which it receives further support. The frame is very low (about 23 in. to the top flange), and there are no kick-ups at the rear, the absence of rear axles in the ordinary sense making them unnecessary. The driving gear housings, which are supported directly on the frame, are arranged in line, in the axis of the chassis and there is a short intermediate shaft with fabric universal joints between them.

Open live shafts having two universal joints each connect the differential gears to the road wheels, these shafts passing through large circular openings in the side members of the frame. One inverted semi-elliptic spring supports the frame on each side. Each spring is mounted centrally on a rubber-covered trunnion,



Mounting of inverted semi-elliptic spring on heavy rubber bushing, a Hansa-Lloyd feature

which is the projecting end of a tubular cross-member. The spring ends slide on wear blocks on the wheel cranks, which take up the propulsive force. A dual Lockheed braking system, operated by two pedals through a Bosch-Dewandre vacuum servo, acts on the six wheels, and a hand brake of the shoe and disk type is also fitted, being located on the transmission shaft connecting the gearbox and overspeed gear. The chief advantage of this rear drive system is that the wheels move straight up and down, without any lateral tilting

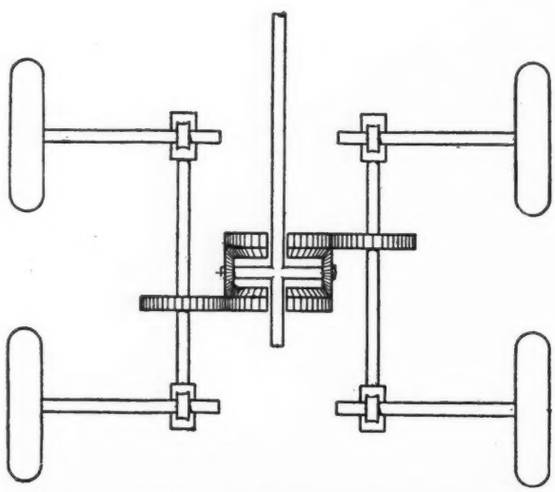
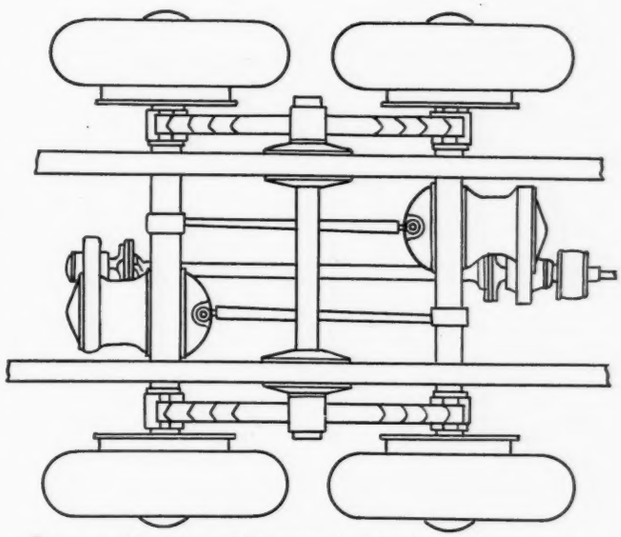


Diagram of drive on Duerkopp six-wheeler

(which latter would change the width of thread and might therefore prove injurious to the tires).

The NAG, which introduce what might be termed a giant chassis, meant to take a bus body for 100 passengers, uses an entirely different rear construction. Here the two rear wheels on each side are mounted on a double-armed rocking lever which is pivoted on a tubular carrying axle located midway between the two sets of wheels and the two driving-gear housings. The gear boxes are fixed to the frame and have undermounted worm drive. The pivot bearings of the rocking levers extend almost to the center of the supporting axle. Inclosed live axles with metal universals transmit the power from the differentials to the road wheels. The central tubular axle carries an inverted half-elliptic spring at each side, the ends of which support quarter-elliptic springs secured under the frame side-members, which latter have kick-ups over the axles. The forward ends of the long springs are hinged to the supporting spring, while the rear ends are shackled. A new six-cylinder 120-hp. engine with overhead valves is used. This chassis has vacuum-operated oil-pressure brakes acting on the four driven wheels.

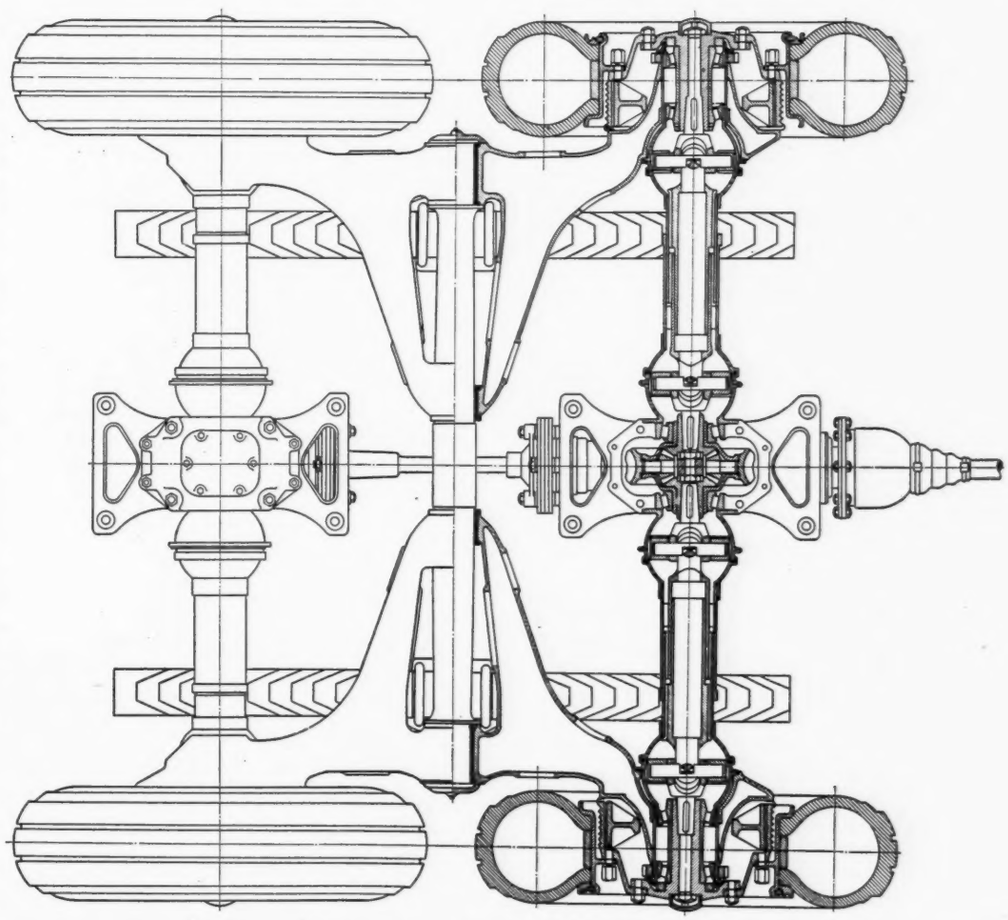


Rear construction of Vomag six-wheeler with separate double-reduction drive to each rear axle

A New Buessing Engine

Buessing has adhered to the six-wheeler with rigid axles, but has adopted spur reduction gears at the hubs, as already mentioned. A new six-cylinder 700 cu. in. engine, built on the well-known Buessing lines, with valves in head, is employed. The air pump for the air brakes is driven from the timing gear, and the oil cleaner is air-cooled. Very massive cranked carrying axles are used. As in former models, the differential gears are out of center, the axles being separately driven. The differential casings lie on top of the dead axles and exposed driving shafts connect them with the spur pinions at the hubs. The axles support the frames through long half-elliptic springs which are mounted underneath the frame side-members on rubber cushions. The frame is arched separately over each axle. The ends of the spring rest on wear plates of an inclosed design fixed to the dead axles. Much use is made of rubber, the engine, gearbox and radiator all being rubber-mounted. A central chassis lubrication system is furnished. A Knorr air brake, an engine brake (shifting cam) and a mechanical handbrake are also provided.

An entirely new six-wheeler has been developed by Daimler-Benz. Its main characteristic is the arrangement of the propeller shaft, which, as in all long chassis, is divided; it is exposed back to one of the cross-members, where it ends in a spherical joint, from which it is continued in a torque tube to the forward rear axle. This consists of a carrying member of deep section, to the center of which the differential gearbox is bolted. In front of the carrying member are the shafts which drive through spur reduction gears at the hub. The

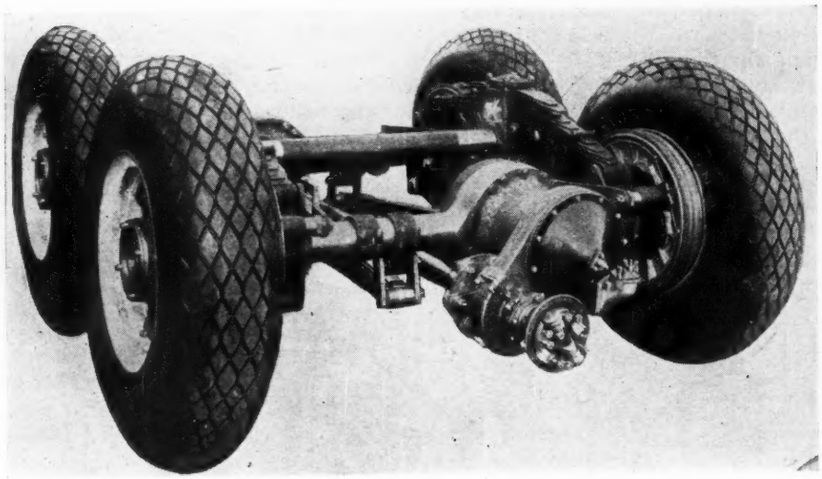


Rear construction of NAG six-wheeler

main propeller shaft is continued through the differential and carrying axle and ends at the back of it in another spherical joint, to which connects a torque tube from the rearmost axle, which is driven in the same way as the first axle. Thus the driving thrust of the rearmost axle is transmitted via the short torque tube to the forward rear axle, and thence through the long torque tube to an X-type very rigid cross-member of the frame.

This chassis is equipped with a 100-hp. engine which also has a tire pump coupled to the timing gear at the flywheel end. Mention should be made of the fact that the radiator is mounted on an extension of the crankcase. Chassis suspension is by long inverted semi-elliptic springs pivoted to the frame centrally between the two axles. The latter are lubricated by pressure gun, and the seven nipples required for this are grouped on the differential housing, where they are not very accessible, but the makers intend to adopt a central lubrication system. The chassis have an overall length of 35 ft. 5 in. and complete with all accessories weighs approximately 10,800 lb. The tires are 40 x 10.5 in. pneumatics. The service brake, actuated through a Bosch-Dewandre servo, acts on all six wheels, while the handbrake acts on the wheels of the forward driving axle only.

Front end of Vomag front-driven bus chassis

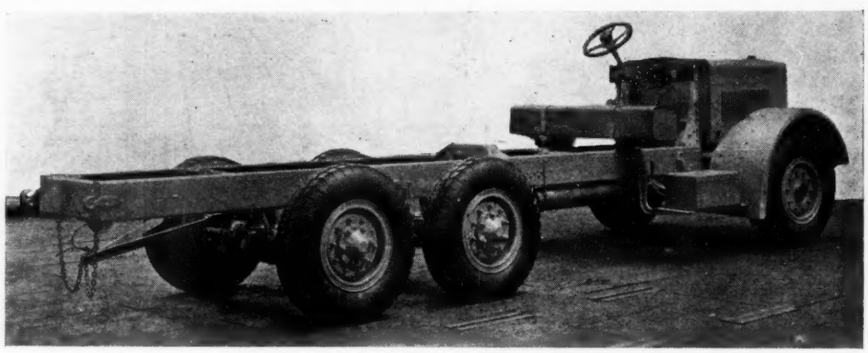


Photograph of rear construction of Vomag six-wheeler

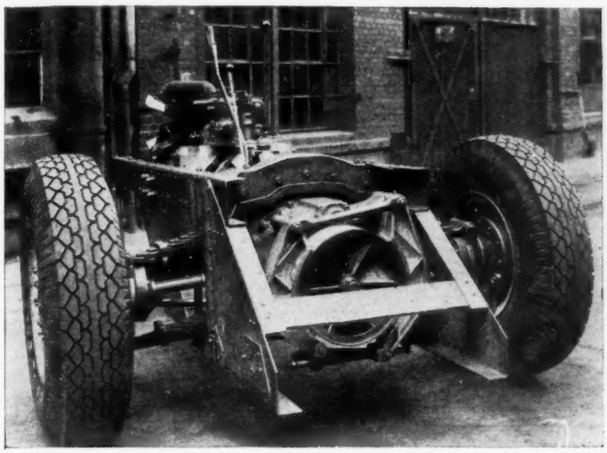
The new MAN six-wheeler has two normal rear axles driven by underslung worm gears, the drive being continued by a jointed intershaft from the first to the second axle. A differential is interposed between axles. A new six-cylinder carburetor-type engine has been evolved by the company and is used in this chassis. It has a bore of 4.33 in. and a stroke of 5.9 in., 518 cu. in. displacement and develops 100 hp. The cylinders are cast in pairs and have detachable heads. Aluminum pistons are used, and the crankshaft runs in seven plain bearings. A vibration damper is fitted. The light metal crankcase is carried almost half-way up the cylinders and encloses the side valve mechanism, which thus is amply lubricated.

This company also again showed its interesting four-wheel chassis with a spur-reduction rear axle. The special feature of this is that, the carrying axle being cranked up at the ends to carry the wheels, admits of the brake rods passing through the hollow wheel spindles to expanding band brakes located on the outside of the wheels. These brakes are accessible after the removal of a cover, which greatly facilitates brake maintenance.

The Vomag company, which has become one of Germany's principal producers of buses and trucks, introduced two important new constructions, one a six-wheeler and one a novel front-drive bus chassis. The six-wheeler has a wholly new kind of drive. The rear axles are of the rigid banjo type with the driving-gear housings out of center. Between them passes the propeller shaft, which drives the differentials through two sets of spur gears. The shaft between the two drive gears is longer than the center-to-center distance between axles, and this reduces the angular movements in the fabric joints that are employed. The axles carry rubber-mounted spiders that serve as shackles between the ends of two inverted half-elliptic springs arranged one above the other on both sides of the frame. They are connected by two torque arms having silentbloc bearings. The



MAN six-wheeler



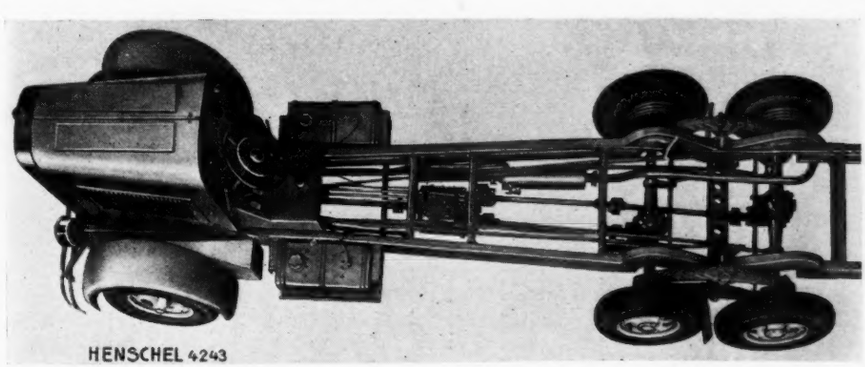
Interchangeable forecarriage of Vomag front-driven bus chassis

double springs are held by a common bracket in the center, the bracket being pivoted to the side-member of the frame, which has kick-ups over the axles.

The chassis has a total length of 40 ft. and is driven by a new six-cylinder L-head engine of 4.52 in. bore and 6.3 in. stroke, delivering 100 hp. As with many other German engines, two carburetors are employed. The engine has three-point support on rubber pads.

Another six-wheeler of new design is by the Henschel company. Compared to the other rather massive looking chassis, this looks quite light, and it is one of the few chassis having a separate gearbox. A six-cylinder engine of 4.72 in. bore and 6.3 in. stroke, and developing 100 hp. at 1250 r.p.m., is used. From the gearbox, amidships, propeller shafts with metal universal joints connect to the two rear axles. The driving gear housings are, of course, out of center. Both axles are driven by under-mounted worms. Propulsion is taken up entirely by the dual springs which are arranged in about the same way as the Vomag springs.

The Krupp company was at the show with its six-wheeler which was first exhibited at the Leipzig Fair last spring has been described in these columns.

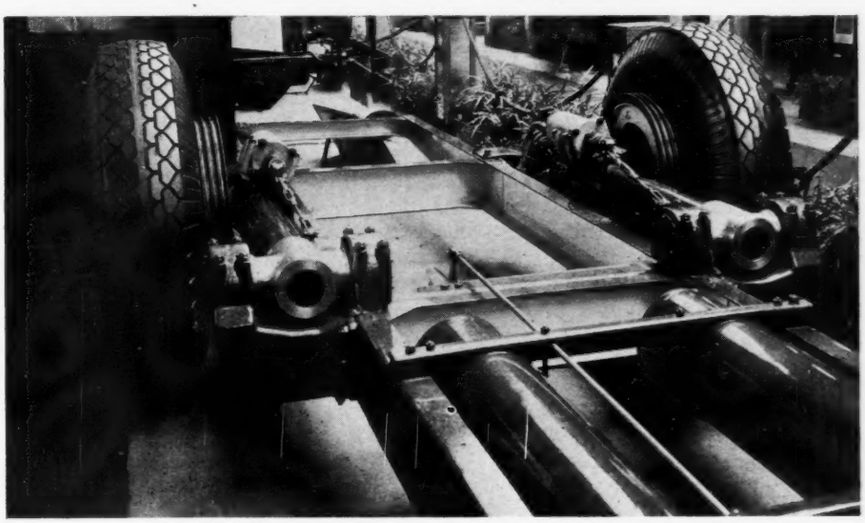


Henschel six-wheeler chassis

The only six-wheeler of non-German make in the commercial car section was the Czecho-Slovakian Tatra. This company builds two chassis, one for 1½, the other for 7 tons. Both are similar in design. The smaller car has a four-cylinder opposed air-cooled engine, while the larger one has a conventional water-cooled four-cylinder engine. The special feature of Tatra vehicles is the frameless construction, the entire load being carried by a central tubular member, which at the front end develops into a cradle supporting the engine and gearbox. The propeller shaft passes through the tube, and since the latter is rigid no universal joints are needed. At the rear it drives to spur differentials, one behind the other, the wheels being arranged on swinging half axles, with long inverted half-elliptic springs. These are pivoted in the center to a cross-member.

Vomag Front Drive Bus

These, briefly, are the various six-wheelers (the chief novelties) in the show. Much could be said regarding details and body designs but that would lead too far. A short description should be given, however, of the Vomag front-drive bus, for this indicates a new direction in bus chassis development. It is now generally acknowledged in Germany that front drive offers advantages in regard to improved traction and safer driving on slippery roads, as has been convincingly shown by the front-drive buses in Berlin. But apart from this, the front-drive designs offer the great advantage of easy interchangeability of the engine units. It is this latter feature which is especially emphasized in the Vomag design, as it takes only a few minutes to replace the engine with a new one and send the bus out on duty again.



Rear end of Vomag front-driven bus chassis with independently-sprung wheels on cranked stub axles

The frame consists of two parts. The forward part has deep section side plates and carries the whole powerplant with control units, which is wholly self-contained. This can be fitted in a few seconds with a collapsible supporting carriage and can then be pulled away from the rear frame.

Kilo-Man-Hour *Proposed* as Gage of *Manufacturing* Efficiency

New method of evaluating the effectiveness of industrial operations suggested in paper at A. S. M. E. meeting. Sessions attended by automotive executives.

By K. W. Stillman

SEVERAL of the professional divisions of the American Society of Mechanical Engineers deal with subjects of direct automotive interest so that a number of sessions of the 49th annual meeting of the society held in New York last week were attended and taken part in by automotive executives.

This was particularly true of the sessions of the Management Division, the Machine Shop Practice Division and the Materials Handling Division which held meetings devoted to subjects such as principles of jig and fixture practice, methods of motor application and control as applied to machine tools, mechanical applications of chromium plating, developments in new cutting alloys, factory lighting problems, a study of the factor involved in the engineering of new manufacturing equipment, commercial airplane development, and a symposium on the skid handling of inter-plant shipments.

Possibly the discussion of broadest interest was built around a paper prepared by L. P. Alford and J. E. Hannum which presented a tentative method for evaluating the effectiveness of manufacturing operation. The authors believed that no satisfactory means had yet been developed for comparing the relative success or failure of an industrial enterprise or to indicate the probable nature of future performance, and their work was an attempt to develop such a means.

After studying the various factors available which might be used for such a determination and considering the findings of Professors Cobb and Douglas to the effect that three-fourths of the increase in production during the period from 1899 to 1922 has been due to labor while only one-fourth has been due to fixed capital; Messrs Alford and Hannum fixed upon the man-power as a proper base for comparison and gathered a vast mass of fact material showing how comparisons made upon this basis indicate actual conditions.

As a base factor the kilo-man-hour (1000 man-hours) has been adopted, and from this base a number of industrial factors can be developed, such as productivity expressed in physical volume of product per kilo-man-hour; labor permanence expressed in total number of workers per kilo-man-hour; fixed capital investment expressed in investment in dollars for buildings or machinery per kilo-man-hour; costs expressed in dollars per kilo-man-hour and various others which can readily be evolved.

Data Based on Census

In support of their thesis the authors have compiled a great mass of statistical data based on the 1925 census and other sources to indicate that by means of the base factor, kilo-man-hours, comparisons can be made with apparent success, not only between concerns in the same industry but between different industries. In other words, by this tentative method, developed to its full extent, it should be possible for any plant executive to determine for himself just how the operations of his own organization stand in relation to others in his own industry or to plants in similar or totally different industries. The ultimate value of such a method, if its practical development is as successful as now ap-

WAGES, COST OF MATERIALS, PRIME COST, VALUE ADDED BY MANUFACTURE, AND VALUE OF PRODUCT PER 1000 FACTORY MAN-HOURS FOR 12 INDUSTRIES

Industries	Ratio of compiled to census production, per cent	Number of companies	Number of employees	Wages per 1000 man-hours	Cost of materials per 1000 man-hours	Prime cost per 1000 man-hours	Value added by manufacture per 1000 man-hours	Overhead, selling expense, and profit per 1000 man-hours	Value of product per 1000 man-hours
Automobiles	83.0	12	151,447	$683	$4,240	$4,923	$2,190	$1,487	$6,410
Manufactured ice	6.2	6	1,061	796	1,010	1,806	3,220	2,334	4,240
Explosives	54.0	16	3,456	437	2,160	2,537	1,800	1,413	3,950
Paper and pulp	23.6	50	28,832	465	1,760	2,225	1,065	600	2,825
Portland cement	88	120	35,000	483	1,025	1,518	1,675	1,183	2,700
Carpets and rugs	8.5	4	2,334	605	1,460	2,065	1,188	575	2,640
Lumber	5.7	34	14,103	702	890	1,592	1,300	598	2,190
Firebrick	12	3	962	600	580	1,180		550	1,730
Rayon	68		3,500	440	350	790	1,330	890	1,680
Cast-iron pipe	6.2		1,783	372	655	1,037	695	313	1,350
Cotton fabrics	3.3	13	11,850	273	831	1,104	493	216	1,320
Leather shoes	2.1	6	6,534	272	605	877	556	243	1,120

pears to be possible, need not be emphasized.

Interesting automotive information compiled by the authors included the statement that for 12 companies the production rate was 9.08 cars per kilo-man-hours; for five parts companies it was 12.85 tons per kilo-man-hours: The value of products of the 12 vehicle plants was $6,410 per kilo-man-hours, which was eighth in rank of a list of 100 major industries of the country. Similar figures for other automotive concerns are: tires, $5,080; springs, $3,160; frames, $2,340; engines, $2,010; wire wheels, $1,730.

This paper aroused a great deal of discussion, with many speakers recognizing the need for such a measuring device for management but questioning the immediate applicability of a definite factor like the kilo-man-hour to plants in which conditions of manufacture, of machine tool equipment and other items may be greatly divergent.

COMPARATIVE PRODUCTION RATES OF SEVERAL AUTOMOBILE COMPANIES

Companies	Number of employees	Number of man-hours worked	Production in number of cars	Production rate in cars per 1000 man-hours	Deviation of rates from weighted mean
A	....	2,745,117	3,355	1.22	— 7.86
B	....	4,841,690	8,801	1.83	— 7.25
C	....	10,285,056	31,769	3.09	— 5.99
D	....	167,946,281	827,056	4.94	— 4.14
E	....	49,574,200	261,164	5.26	— 3.82
F	....	7,781,347	45,310	5.82	— 3.26
G	....	6,670,741	45,300	6.79	— 2.29
H	....	2,581,744	27,893	10.80	+ 1.72
I	....	19,816,711	32,122	16.20	+ 7.12
J	....	2,146,331	39,980	18.60	+ 9.54
K	Largest	106,200,000	2,090,959	19.70	+10.62
L	Smallest	1,621,958	59,074	36.40	+27.32
12	151,447	382,211,176	3,472,783	9.08	90.93

Mean deviation of rates 7.58
Coefficient of variation of rates, per cent 83.5
Ratio of maximum to minimum rates .. 29.9

Census Data

Number of companies	Number of employees	Production in number of cars	Ratio of compiled to census data
297	197,728	4,178,247	83 per cent

	Amount (dollars)	Unit value per car (dollars)	Value per 1000 man-hours (dollars)
Wages	341,210,401[1]	75.20	683
Cost of materials	2,108,191,812[1]	466.00	4,240
Value added by manufacture	1,089,930,821[1]	241.00	2,190
Value of product	2,952,650,573	706.00	6,410

[1] The value of product corresponding to these values is $3,198,122,633, which is 8 per cent. higher than the value of product corresponding to the quantity of product. The rates have been adjusted accordingly.

In summing up, Mr. Alford emphasized the fact that it was a tentative method only, that it could not be taken for granted as being a proper measuring stick until it had been tested much more thoroughly than it has been, and, finally, that the only way to determine whether it does work is to try it out in particular industries and compare the results against known conditions.

Another interesting session was devoted to a discussion of skid-handling of inter-plant shipments in which the automotive industry has progressed further, perhaps, than any other. A number of concerns, such as the Bendix Brake Co., Continental Motors Corp. and Clark Equipment Co., ship a very large proportion of their products on skids which eliminate all handling from the time the products leave the final assembly line in the producing plant until they arrive at the production line of the vehicle plant.

The subject was treated in formal papers from many different points of view. C. B. Crockett, The Society for Electrical Development, discussed the general economic phases of the subject and pointed out that freight rates are a relatively small proportion of the total cost of transferring materials between plants with ordinary methods, the cost of loading, unloading and transportation to and from the freight cars often being four times as much as the actual freight bill. By handling material on skids, Mr. Crockett pointed out, savings would be made possible in labor, in time of loading and unloading, in container costs and in damage to the material, the total savings becoming of real importance.

As an example, he cited the experience of the Hupp Motor Car Corp., which formerly unloaded a carload of crankshafts for about $24, requiring the services of eight men for 7½ hrs. Now that the shafts are received on special skid racks, one man and a helper unload a car in 45 min. at a cost of 98 cents and the car is released and the unloading dock cleared on the same day.

R. L. Lockwood, Department of Commerce, stated that a study made by the department indicated that for every dollar spent in getting a product from the factory into the hands of the consumer, 10 cents represented the actual cost of rail or water transportation and 90 cents represented the cost of packing, handling, loading, unloading, rehandling, etc. A considerable portion of this 90 cents of cost can be eliminated by skid-shipments, the greatest obstacle to its wider adoption at present being the lack of uniformity in skids and lift trucks to handle the skids. For about six months the department has been working with shippers, carriers, and manufacturers of skids and lift trucks in an attempt to establish some basis for standardization and results of great value to all shippers and receivers of material are expected from this activity.

Other speakers at the meeting discussed other phases of the question, such as the relation of skid shipments to rail and water transportation, how skids have been employed to great advantage in railroad organizations, and similar subjects, all of which pointed to the really important economies which appear to be possible once this method of interplant shipment is placed in widespread use.

Interest in Cutting Alloys

Interest is still increasing in the possibilities offered by the development of new cutting alloys such as Carboloy, and a talk on this material by Dr. Hoyt, General Electric Co., brought forth much discussion. This material has been mentioned several times before in *Automotive Industries* but it appears to be such an important development that still further mention seems warranted, particularly since more information concerning it is becoming available almost daily.

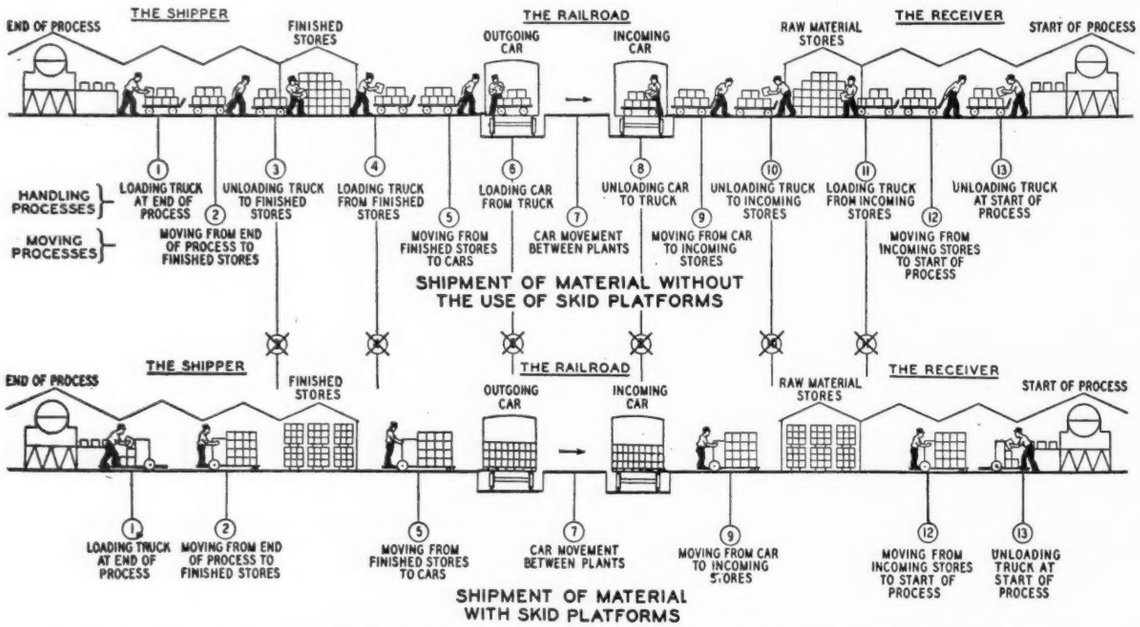
A good indication of what Carboloy can do is contained in the test given to a sample tool from every lot of the material made. It must be able to cut for 10 minutes, without showing any signs of wear, a chrome-nickel bar at a feed and speed which causes a high speed tool to fail completely in less than 10 sec.

Dr. Hoyt stated that Carboloy can be ground without difficulty by the use of special carborundum wheels which are now available in stock from at least two makers. By lapping processes, particularly diamond lapping, Carboloy tools can be worked to a half a mil. The shape of the tool and the angles to which the edge is ground have great influence upon the cutting properties of Carboloy tools and reduced feeds generally give

better results. Present indications, Dr. Hoyt said, are that the cross section of the chips should be of the order of one per cent of the tool cross section with actual feeds of 1/32 to 1/64 in.

Experience with these tools so far indicate that machine tools which do not permit much higher speeds of a wide investigation into the mechanical applications of chromium plating, this investigation being confined to uses in which chromium plating is employed principally to increase the resistance to wear and abrasion.

The most successful uses of chromium plating are


THE SHIPPER
END OF PROCESS
FINISHED STORES
THE RAILROAD
OUTGOING CAR
INCOMING CAR
RAW MATERIAL STORES
THE RECEIVER
START OF PROCESS
HANDLING PROCESSES
MOVING PROCESSES
1 LOADING TRUCK AT END OF PROCESS
2 MOVING FROM END OF PROCESS TO FINISHED STORES
3 UNLOADING TRUCK TO FINISHED STORES
4 LOADING TRUCK FROM FINISHED STORES
5 MOVING FROM FINISHED STORES TO CARS
6 LOADING CAR FROM TRUCK
7 CAR MOVEMENT BETWEEN PLANTS
8 UNLOADING CAR TO TRUCK
9 MOVING FROM CAR TO INCOMING STORES
10 UNLOADING TRUCK TO INCOMING STORES
11 LOADING TRUCK FROM INCOMING STORES
12 MOVING FROM INCOMING STORES TO START OF PROCESS
13 UNLOADING TRUCK AT START OF PROCESS
SHIPMENT OF MATERIAL WITHOUT THE USE OF SKID PLATFORMS
THE SHIPPER
END OF PROCESS
FINISHED STORES
THE RAILROAD
OUTGOING CAR
INCOMING CAR
RAW MATERIAL STORES
THE RECEIVER
START OF PROCESS
1 LOADING TRUCK AT END OF PROCESS
2 MOVING FROM END OF PROCESS TO FINISHED STORES
5 MOVING FROM FINISHED STORES TO CARS
7 CAR MOVEMENT BETWEEN PLANTS
9 MOVING FROM CAR TO INCOMING STORES
12 MOVING FROM INCOMING STORES TO START OF PROCESS
13 UNLOADING TRUCK AT START OF PROCESS
SHIPMENT OF MATERIAL WITH SKID PLATFORMS

Operations involved in physical distribution of goods with and without use of skid platforms

than are used in present practice do not permit the use of Carboloy to the best advantage. The tool enters the class of durable tools but, with present machines, does not speed up production commensurate with its inherent cutting capacity.

In this connection it may be of interest to recall a statement made by Mr. Burt, Pratt & Whitney Co., at the recent Production Meeting of the S.A.E. While in Europe last summer, Mr. Burt watched the operation of a lathe specially built to use Widia metal. Widia metal, as is generally known, is a Krupp tungsten-carbide-cobalt product developed for the same purpose as Carboloy and probably capable of similar results.

The test started on a steel bar with a ½ in. cut, a 0.020 in. feed and a speed of 400 surface ft. per min. The tool handling this work all right, the speed was increased to 500 ft. per min., and finally to 600 ft. per min., at which rate the tool still showed no signs of distress and continued to leave a fine finish on the bar. Mr. Burt was particularly interested to find that even at this high speed very little heat was retained in the work, the tool apparently dissipating the heat almost as fast as it was generated.

Later, in England, Mr. Burt watched a newly developed planer cutting a steel slab with a tool of Widia metal. The cut was ¾ in. deep, the feed was 1/16 in. and, on the cutting stroke, the planer table was traveling at the rate of 280 ft. per min.

All of these items are indications, as was borne out by the comments made after Dr. Hoyt's paper, that there must and will be considerable progress in machine tool design within the next few years in order to make available to machine tool users the metal removing abilities which are inherently present in these new cutting alloys.

W. Blum, Bureau of Standards, reported the results upon measuring instruments, such as gages of all types. Upon forming and molding dies it is generally satisfactory and beneficial, especially if the service does not involve too severe impacts. Upon cutting tools it is of doubtful value although in numerous applications it has proved successful. Upon moving parts of machinery there have been but few successful applications, but these indicate that further study might develop many other uses.

Mr. Blum emphasized the point that the greatest source of savings through the use of chromium plating was not in the cost of tools which might be given a longer life by this means, but in the reduction of times a machine must be stopped to change tools or dies and the manufacture of more uniformly dimensioned parts through the use of tools and dies which wear less rapidly than those now used.

Value of Anti-Friction Bearings

Discussion as to the real value of anti-friction bearings developed at the symposium on methods of motor application and control, some speakers expressing the opinion that a properly-designed plain bearing was often as good. For use on modern machine tools, in particular, it was pointed out by those who favor the anti-friction type bearings, the possibility of fitting shafts with smaller clearances, thus reducing the possibility of chatter and vibration, and the greatly improved lubrication conditions are the chief reasons why anti-friction bearings are increasing in popularity with machine tool designers.

The symposium included a paper on the use of motors for planer service, presented by F. E. Cardullo, G. A. Gray Co.; one on the application of motors to special drilling and tapping machinery by J. H. Mansfield, Greenlee Bros. & Co.; another on motor drives

for precision grinding machines by R. E. W. Harrison, Cincinnati Grinders, Inc., and a final paper on motor applications on lathes by C. L. Cameron, Monarch Machine Tool Co.

In all these papers the advantages of direct motor drive was emphasized while special motors, as of the multi-speed type, were recommended for many applications where a single speed would not permit full utilization of the metal removing capacities of the machine.

Another symposium in which three papers were presented discussing various aspects of factory illumination disclosed great interest in the subject. Factory executives, apparently, are beginning to realize the influence of adequate illumination on operations and are giving the subject considerably more than the casual regard customary a few years ago.

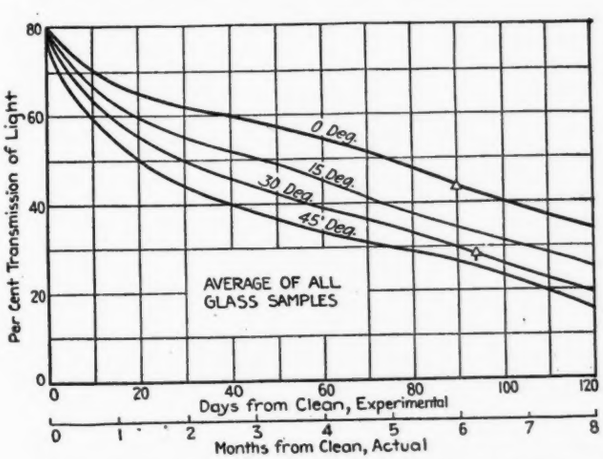
Daylight Illumination

A paper by H. H. Higbie, University of Chicago, and W. C. Randall, Detroit Steel Products Co., gave a very thorough analysis of the problems presented in designing a factory for daylight illumination. The paper reported the results of a very extensive study of theories, of models and of actual conditions, and contained, in an appendix, a recommended method of procedure for calculating the daylight illumination to be obtained from any building design.

The other papers discussed various means of artificial illumination and indicated that this element in factory operation might well be given more attention than it has received. For example, in a paper presented by two members of the Detroit Edison Co., it was pointed out that a survey of 20 Detroit industries indicated that approximately 35 per cent of the electrical energy consumed is used for lighting and only 65 per cent for power.

From a number of actual installations about Detroit, in which lighting conditions have been improved, the authors stated that it had been definitely proved that adequate lighting will produce an increase in production, will aid accident prevention, will decrease labor turnover, will be a factor in the continued health of the employees and will decrease spoilage.

During discussion of the papers, the point was made that in this age of specialization illumination has fallen by the wayside. In nearly every other industrial field conditions are analyzed before any change is made and the installation of tools, equipment or what-



Amount of light transmitted by windows, as per cent of that which is available, is markedly reduced by accumulations of dirt, particularly in the first few weeks after washing them, as shown by both field tests and laboratory experiments

not made to fit the conditions present. With lighting problems, however, this is rarely done and a single method of illumination, whether daylighting or artificial, is considered satisfactory for the entire plant. It was suggested that mechanical engineers and others having production operations in charge might study illumination problems and learn what might be accomplished in the way of improving operations by fitting the illumination more closely to the needs of each particular work station.

J. R. Shea, Western Electric Co., Inc., presented a paper in which he discussed the outstanding economic and technical factors involved in the engineering of new manufacturing equipment. When changing conditions call for an increase in the volume of business beyond present plant capacity, a change of the design of the product or an improvement in the manufacturing process, Mr. Shea said good management demands that in every case the necessary equipment shall be secured on the basis of its ability to produce the finished article to the desired accuracy and at a minimum cost.

In order to insure that equipment of the proper type shall be secured it is necessary to make a thorough analysis of the entire problem based on a study of the principle economic and technical factors involved.

As to the economical factor, Mr. Shea believes it is usually possible to manufacture an article in several ways and the costs of the possible methods should be summarized as an aid in making the final decision. In making such estimates he emphasizes the importance of including the item of building investment which may be saved by using a machine of modern design.

The technical factors involve a study of the design of the product, of processes for its manufacture, of the machine equipment and of the factory arrangement. All of these items must be analyzed in relation to such items as the quantity to be manufactured, the permanency of the product, choice of materials and similar items. The entire problem of selection or development of new manufacturing equipment, Mr. Shea believes, is an engineering problem and should be solved on the basis of sound economic and technical investigation.

Aviation Session

At the session devoted to developments in commercial aviation, G. M. Bellanca, Bellanca Aircraft Corp., presented a paper in which were outlined some of the factors that have contributed to the present day success of aviation. These developments include the air-cooled engine which has cut down weight, improved performance and reliability, and reduced cost of maintenance; greater reliability through such things as slotted wings and rear flaps; fuel injection engine developments, and others.

T. P. Wright, Curtiss Aeroplane and Motor Co., Inc., told of some of the problems which confront the airplane designer in trying to adapt airplanes to commercial uses. The fundamental requirements of a commercial airplane, according to Mr. Wright, are singleness of function, safety and reliability and economy. The design elements which enter into the ultimate satisfaction of these ideals include the load to be carried, the performance desired, the powerplant available, the arrangement of the plane, aerodynamic considerations, factors of safety and degree of reliability, weight, ease of maintenance, and materials to be used.

In the actual development of commercial planes there are several different uses to which they may be put and each one needs special consideration in designing rooms to meet the particular operating requirements.

S. A. E. AERONAUTICAL MEETING

(Continued from page 857)

aerodynamic considerations. It also makes possible the provision of promenade decks and an increase in comfort through the use of larger quarters.

During the coming year, Dr. Arnstein said that further milestones would be set by further crossings of the Graf-Zeppelin, as well as the putting into commercial transport use between Canada and England and other points of the British dirigible. The maiden flight of the 200,000 cu. ft. all-metal dirigible being built in Detroit is another interesting high point in the next year's development. Fuel gas will be used in the American-built dirigibles of the Goodyear-Zeppelin Corp.

In closing, Dr. Arnstein pointed out that the use for transoceanic and other long-distance flights of large airships should increase rather than decrease the use of airplanes, in view of the fact that a saving of a few days in an ocrean crossing would emphasize the unsatisfactorily slow land transportation available at present.

One of the chief problems mitigating against the acceptance of the dirigible for commercial scheduled transportation is the mooring difficulty, especially in bad weather. An interesting paper bearing on this subject was presented by Lieut.-Commander Charles E. Rosendahl, of the Navy. Commander Rosendahl's paper dealt with "Recent Developments in Short Mooring Masts and Handling Trucks." This mast, which is in use at present at Lakehurst, is nothing more than a timber radio mast which had outlived its usefulness. Mooring is accomplished by a cone and cup arrangement of universal mounting to permit the ship to turn with the wind. A problem has been to keep the tail of the ship from rising with sudden changes in temperature or with vertical gusts. Various methods have been suggested and tried to hold down the tail and still let the ship swing with the wind. The most successful has been found, in connection with the stub mast, to be a carriage running on a circular track or rails so constructed as to hold the ship down and yet to let it move freely around the mast.

The third and last paper on the program was that of Lieut.-Commander Clinton H. Havill, also of the United States Navy, who discussed aircraft propellers from a theoretical and practical angle. Commander Havill gave a number of formulae of empirical character for design purposes, charts giving diameter and blade setting according to horsepower required.

Joint Standards Meeting is Held

ONE of the most interesting standards sessions held in some time resulted from combining the Joint Standards Committee meeting, the open standards session and the meeting of the Aeronautic Standards Division into one consecutive meeting. Discussion was aroused on nearly every report presented. The meeting opened with Chairman J. Don Alexander calling for suggestions for standardization work.

It was decided to create a new spark plug subdivision to take care of the standardization of thread plugs in the smaller sizes, especially in view of the fact that but little difference could be detected by the eye between ½ in. and 18 mm. plugs. The members in general seemed to favor standardization on the 18 mm. plug only, to simplify international standardization.

Tail wheel standards also came up for discussion. Mr. Naylor of Stinson pointed out that 14 by 3 and 18 by 3 in. wheels with pneumatics had already been standardized. It seemed that these two sizes in the opinion of a number of members were not sufficient to cover the complete range of airplane demand. Some wanted wheels with wider treads for soft ground, some solid wheels, some intermediate sizes. Another point that was brought up for discussion was steering wheels, and it was recommended that these be standardized on the basis of the largest wheel and its hub, so as to make all interchangeable.

Streamline Strut Standardization

Streamline strut standardization was also suggested, it being pointed out the Aluminum Co. has one set of standards, Ohio Seamless another, and the Army another. Lieutenant Hardecker of the Navy reported that his division was working on that problem and would have something to offer in the near future.

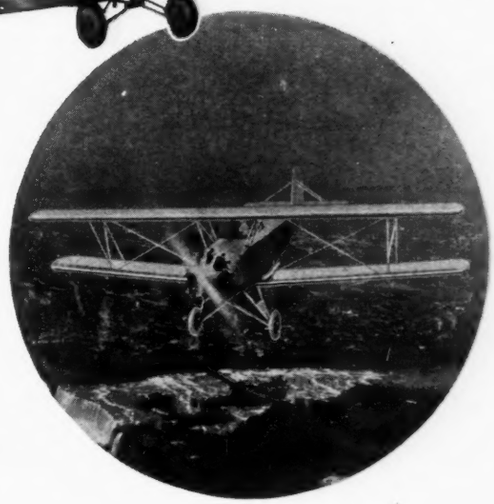
Steel tubing standardization of section, standardization on a Grade A and Grade B aviation fuel, standard ventilator construction or bases therefor, and the general desirability of international cooperation in standardization wherever possible were further points emphasized during this part of the meeting.

B. J. Lemon presented the report of the Tire Division, including a list of sizes suggested for tentative standardization. It was brought out during the discussion that no benefit would accrue to either tire or rim manufacturers through the use of automobile tires on airplanes. There seemed to be a rather widespread demand, however, for a number of sizes of tires and rims between the 12 in. and 18 in. diameter, also for larger rim widths on wheels of this general size. There was also considerable discussion whether tire weights should be included in the standards, it being felt on one hand that the manufacturers of high-grade tires should be protected from competition of inferior materials at lower prices at an increase in weight, and on the other hand that it would be an encroachment on the right of the airplane manufacturer to buy according to price regardless of weight.

Tentative approval was accorded the tachometer drive standardization report submitted by Arthur Nutt. There seemed to be very little general opinion regarding the most desirable types of landing lights, except that these should be retractable. In so far as adjustability to any position from near horizontal to vertical and from crossing in front to divergent was concerned there was little unanimity.

After considerable argument, led by Lieut.-Commander C. H. Havill, the proposed revision of S.A.E. splined propeller hubs, with a number of minor modifications, was adopted except for Hub No. 30, used chiefly on the Pratt & Whitney Wasp. There seemed to be considerable difference of opinion as to which were the correct Wasp specifications and in the absence of representative of Pratt & Whitney it was decided to adopt the proposed revision with that exception.

Left—One of the newest planes at the show was this Fokker Amphibian powered with a Wright "Cyclone" or Pratt & Whitney "Hornet." Below — Another new plane was the Mercury "Kitten," produced by the Aerial Service Corp.—a four-place cabin type ship. In Circle—Flight view of the new "Husky Junior," a commercial training plane by Consolidated



Aircraft Show Gives Industry New Prestige

Chicago Exposition most successful ever held in this country. Many new planes and engines shown.

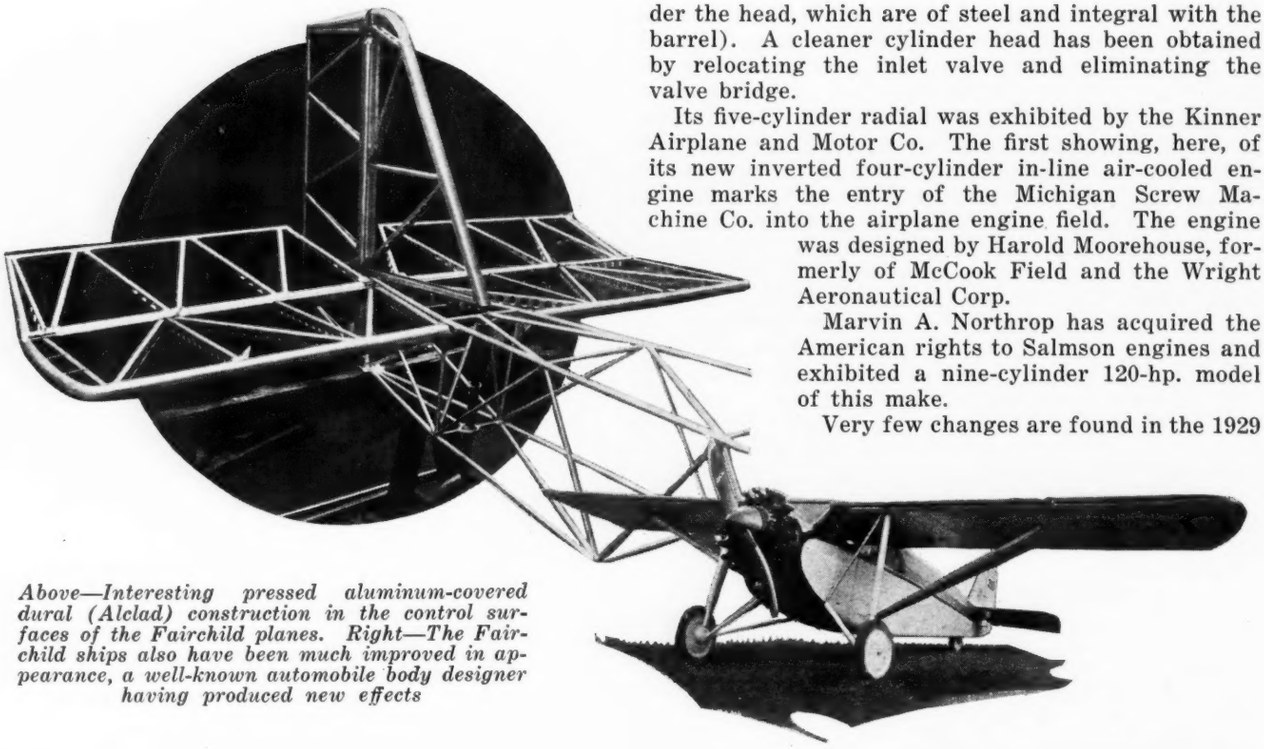
AN undoubted success, and certainly the finest show of its kind ever held in this country—at least as far as number and diversity of exhibits are concerned—the Chicago Aeronautical Exposition came to an auspicious end last week. It is yet too early to gage completely its effect on the aeronautical industry, but aside from numerous sales of ships and connections established with multitudes of new dealers and distributors, the nation-wide attention which the exposition attracted will do much to confirm the growing impression that at last the aircraft industry is here to stay and to become one of the nation's important industries.

Space limitations prevent a complete technical description of all of the planes, engines, and accessories shown, so this report will be confined to a brief summary of the first two, planes and engines.

Taking the engine manufacturers first, the Aeronautical Products Corp. exhibited for the first time its four-cylinder in-line air-cooled Scorpion engine rated at 100 hp. at 1800 r.p.m. This engine has a bore and stroke of 4⅝ by 5 in., giving it a piston displacement of 336 cu. in. It is stated that this engine, with a compression ratio of 6.5 to 1, has developed 143 hp. at 1800 during a 50-hr. full throttle run. It is featured by the use of flat cantilever valve springs instead of the usual coiled type. Cylinder barrels with their lower fins are turned from forgings. Heads are of aluminum alloy. The 2¼-in. crankshaft has five main bearings while the gear-driven camshaft is carried overhead. The engine will run just as well inverted, it is claimed, according to Alexander Johnston, president. The plant of this company is equipped to turn out 25 engines per day.

The Axelson Machine Co. exhibited the engine formerly known as the Floco, manufacturing rights to which were recently acquired by it. This engine, which is of the seven-cylinder air-cooled raidal type and of 150 hp. output, has passed the Government 50-hr. test. Its master rod is particularly interesting in that the No. 1 rod, instead of being integral with the hub, is mounted on it on two pins. This design makes for easier manufacture, by simplifying the steel forgings. The camshaft and all gears are nitrided. Individual fins are pressed onto the barrel, the head being of aluminum. An oil cooler is formed integral with the carburetor riser.

E. W. Bliss Co. exhibited a Bristol Jupiter and a Titan, having secured a license for the manufacture of these two British engines in the United States. The Titan is a five-cylinder air-cooled radial intro-



Above—Interesting pressed aluminum-covered dural (Alclad) construction in the control surfaces of the Fairchild planes. Right—The Fairchild ships also have been much improved in appearance, a well-known automobile body designer having produced new effects

duced recently. It has a piston displacement of 842 cu. in. and develops 200 hp, at 1700 r.p.m. for a dry weight of 500 lb. Its cylinders are interchangeable with those of the Bristol (Bliss) Jupiter.

A six-cylinder radial air-cooled engine was exhibited for the first time by the Brownback Motor Laboratories, Inc. It has a bore and stroke of 4⅛ by 5 in. and is designed to develop 120 hp. at rated speed. All accessories are inclosed within the mounting ring. Rockers for both valves are mounted on a single cylinder boss, to reduce the drag resistance by superimposing them. Cylinders are of cast iron and are held down by long eye bolts from pins carried in bosses on the outside of the crankcase. The crankshaft, of course, is of the double-throw type.

With the recent acquisition of American manufacturing rights to the British "Cirrus" engines, one of these four-cylinder in-line air-cooled powerplants was exhibited by American Cirrus Engines, Inc.

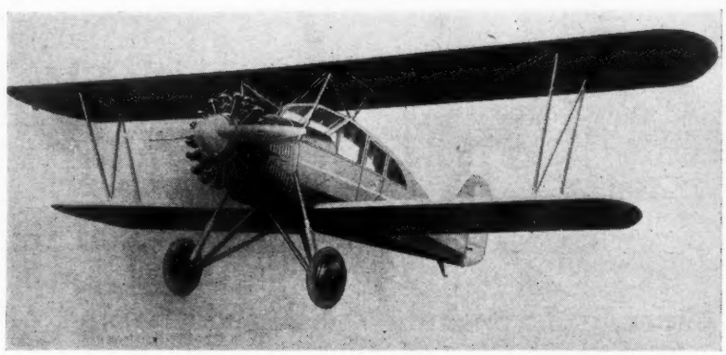
Three of its most recent engines, the Challenger, Chieftain and geared Conqueror, were exhibited by the Curtiss Aeroplane and Motor Co. The Challenger, it will be remembered, is of the six-cylinder staggered radial double-throw crankshaft air-cooled type. It develops 170 hp. at 1800 r.p.m. and is designed specifically for commercial use.

K. G. Frank, Inc., which has taken over the American distribution of Siemens & Halske engines, exhibited three models, the Sh 12, Shr 13 and Sh 14. The last two are similar to the previous five and seven-cylinder engines, but have a bore 1/5 in. larger, which increases the horsepower of the five-cylinder model from 70 to 80, and that of the seven-cylinder from 96 to 110, both at 1800 r.p.m.. They now have bolted-on heads to facilitate valve grinding, etc. Cylinder barrel fins are now of aluminum, and are cast directly onto the steel barrel (except the two fins directly under the head, which are of steel and integral with the barrel). A cleaner cylinder head has been obtained by relocating the inlet valve and eliminating the valve bridge.

Its five-cylinder radial was exhibited by the Kinner Airplane and Motor Co. The first showing, here, of its new inverted four-cylinder in-line air-cooled engine marks the entry of the Michigan Screw Machine Co. into the airplane engine field. The engine was designed by Harold Moorehouse, formerly of McCook Field and the Wright Aeronautical Corp.

Marvin A. Northrop has acquired the American rights to Salmson engines and exhibited a nine-cylinder 120-hp. model of this make.

Very few changes are found in the 1929 models Pratt & Whitney Wasp and Hornet. The model C Wasp has had several vertical fins added between the valves, for better head cooling. A two-to-one reduction gear, built into the nose of the engine, was shown on the Hornet. This installation is particularly neat, involving very little increase in crankcase size.



Cabin biplanes with the upper wing considerably above the fuselage have become more popular. This Butler ship was only one of several of this type at the show

Its three-cylinder air-cooled engines was exhibited by the Szekely Aircraft Corp. This company has entered the airplane manufacturing field.

The 110-hp. Warner Scarab was shown by the Warner Aircraft Corp. Another foreign type of engine, the Walter, of Czecho-Slovakia, was exhibited by the Spartan Airplane Co. which has acquired the American rights.

Of widespread interest was the first exhibition of its series J-6 engine by the Wright Aeronautical Corp. This replaces the nine-cylinder 200-hp. Whirlwind, and is manufactured in three sizes, with five, seven, and nine cylinders, 94 per cent of the parts of all three engines being interchangeable. A striking change is the removel of the valve-operating mechanism to the rear of the engine, which has made possible the installation as standard equipment of a neatly

faired annular exhaust collector ring at the front. Inside of the ring are shutters to control cylinder barrel and crankcase oil temperatures. These shutters are cable-operated from the pilot's cockpit, with a spring return control. The power rating is 150 hp. for the five, 225 hp. for the seven, and 300 hp. for the nine-cylinder model. Additional changes include an increase of ½ in. in the cylinder bore, and the adoption of a rotary induction system. Wright Cyclones were also shown.

In reading these brief notes it will have been observed that a large proportion of the engines exhibited at Chicago were of foreign design. This is no reflection on American engine manufacturers, but is due chiefly to the fact that the capacity of domestic engine manufacturers is far below the demand from the plane manufacturing industry, and to meet this demand it has become necessary to import large numbers of engines.

Taking the airplane exhibitors alphabetically also, the Acme Aircraft Corp. showed its new parasol monoplane-type sports two-seater which is powered with the Velie five-cylinder, 60-hp. engine and priced at $3,150. It is of conventional design, except for the fact that it has folding wings.

The Advance Aircraft Corp. showed its latest model Waco planes, one of which was suspended from the roof of the Coliseum in such a manner as to make it appear to be in a sharp bank. This well-tried design has been improved from year to year.

A new four-passenger cabin monoplane for private use was introduced by the Aerial Service Corp. The Mercury "Kitten," as it is called, is notable on account of the fact that its structure contains no wood. Alloy steel is used for all structural members, tubing for wing beams and ribs; the cabin is sheathed in aluminum alloy, the rear fuselage and wings are fabric-covered, and the fuselage has a frame of steel tubing. The entire roof of the cabin is of pyrolin, for visibility, and is provided with silk draw curtains to shut out glare, if desired. The landing gear is of the split type, with Bendix brakes. Wings are externally braced, and ribs are tack-welded to the wing beams. It is powered with the Warner Scarab. As on many of the new planes, the equipment includes triplex glass, an automatic windshield wiper and a cabin heater. Windows in the doors may be folded down.

This company is also exhibiting an interesting combination wheel and ski landing gear. The wheel projects through the ski for normal landing conditions. If the snow is deep the wheel will break through and the skis will come into action. Skis are made with either wood or duralumin bottom. Bracing is conventional. The structure has been approved by the Army Air Service.

Its light airplane was exhibited by the Aeromarine-Klemm Corp. It is a development from the Klemm-Daimler glider. It is intended for training work and therefore has the unusually low landing speed of 23 m.p.h., its top speed being in the neighborhood of 90-100 with a 40 hp. Salmson. With dual controls it lists at $3,500. Wings are of plywood, and the fuselage has a laminated wood frame.

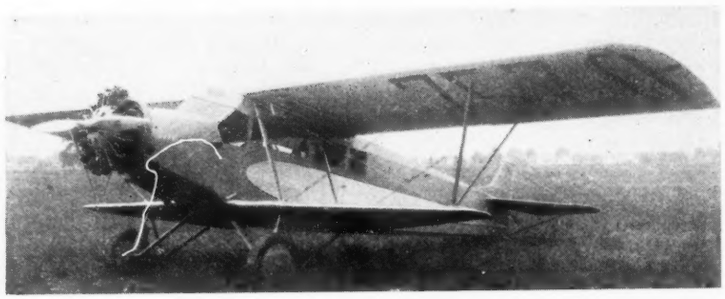
Air-Craft Monoplane

The first showing of its two-passenger monoplane was made by Aire-Craft, Inc. It is conventional, with externally braced wings, and a steel-tube fuselage. It is designed for a 60-hp. engine. The Alexander Eaglerock is too well known to need much comment. A minor modification has been made in the provision of a separate center section in the upper wing.

The Alliance Aircraft Corp. showed a conventional single-bay two-place biplane with a Hess-Warrior seven-cylinder radial air-cooled engine. Four types of planes were exhibited by the American Eagle Aircraft Corp., which during the past 12 months has built and delivered more than 400 planes, climbing from seventeenth to third position. The ships exhibited included a three-passenger full cantilever monoplane of low parasite resistance, and with velour upholstery, triplex glass, Bendix brakes, crank-operated windows, and an indirectly-illuminated instrument panel. In addition to this ship there were a new small folding-wing sport biplane, and a new two-passenger school plane. Last year's three-passenger open-cockpit biplane was also shown. This com-

Above—Note the opening in the center wing section of this Mono Aircraft new training plane, for better visibility. Right—General Airplanes Corp. had its first public showing in Chicago. In the picture, from left to right, front row, are J. Steenson, executive engineer, formerly of Fairchild; J. MacPhail, chief mechanic, formerly of Wright Aero and later with Byrd; Roger Q. Williams, chief pilot, formerly pilot of the Roma; L. A. Listug, treasurer of the company; A. H. Longbotham, advertising manager

pany has just increased its plant capacity from 25,000 to 65,000 sq. ft. as part of a $1,000,000 expansion program. Its output for 1929 is estimated at 1200 planes. Barney Oldfield, the well-known former racing driver, is now on the board of directors.



Buhl Senior Airsedan powered with a Pratt & Whitney "Wasp"

An Avro Avian, well known in England, was exhibited by American Cirrus Engines, Inc., whose powerplant was installed in this ship.

One of its B-1E flying boats was exhibited by the Boeing Airplane Co. It has a plywood fuselage, a Pratt & Whitney Wasp engine, and a six-passenger de luxe automobile type cabin. This machine is of the pusher type.

Both of its cabin sesqui plane types were exhibited by the Buhl Aircraft Co. The Senior Airsedan shown was fitted with a Wright Cyclone engine, which is said to give this ship a top speed of 140 m.p.h. and a payload capacity of 3000 lb., while the landing speed is kept down to 45 m.p.h. It is an eight-place ship, somewhat larger than the former Airsedan model. The Sport Airsedan shown was fitted with a Wright J-5 engine, giving this ship also a top speed of 140 m.p.h. This ship was the winner in its class at the Los Angeles air races.

A four-place cabin biplane (Wright J-5) was exhibited by the Butler Aircraft Corp., a newly formed subsidiary of the Butler Mfg. Co., steel products manufacturers. A feature of this ship is the placing of the upper wing considerably above the fuselage, as in open cockpit types, for better center section efficiency. Brakes, Oleo shock absorbers, Alemite chassis lubrication, adjustable fins and stabilizer are included in the equipment.

Capital Aircraft Corp. exhibited its new "Air Trainer" two-place open cockpit parasol monoplane with LeBlond 60-hp. engine. It is priced at $2,875. Cessna Aircraft Co. showed, in addition to its four-passenger cabin job, a larger six-place ship along the same general lines, designed for the 300-hp. Wright J-6 or the Wasp engine.

Open Cockpit Ships

Two of its open cockpit ships were exhibited by Comand-Aire, Inc. These were powered respectively with a Curtiss OX and a Walter 120-hp. engine. Two of its Husky Junior training planes, developed from the well-known air service training planes of this company, were exhibited by Consolidated Aircraft. This ship has been approved by the Department of Commerce. The seating is of the tandem type, but both instructor and student are in the cockpit.

Driggs Aircraft Corp. exhibited its "Skylark," equipped with the Michigan Screw Machine Company's Rover 60-hp. engine. This inverted four-cylinder in-line air-cooled job makes a particularly neat installation in this ship. It is well cowled in, and the removal of the exhaust stacks and head from the top to the nose makes for rather unusual visibility.

Another two-place dual control side-by-side sport plane was shown in the booth of the Arrow Aircraft and Motors Corp. It is characterized by a high stagger, is powered with a LeBlond 60-hp. engine, and sells for $2,500.

Fairchild Airplane Manufacturing Corp., having branched out its offering to a complete line of ships, showed its three new models, the 21, a two-passenger tandem, low-wing monoplane, the 41, a four-place cabin conventional high-wing monoplane of very much more pleasing lines than its predecessor, and the 71, a seven to eight place enlarged edition of the 41. Prices for the three models are $4,250, $8,950, and $18,900. Characteristic of the cabin jobs is a new folding wing construction. The wing has a quick release folding wing flap with a positive mechanism. The wing center section is trapezodial in shape, which makes for easier locking. One man can fold both wings back in two minutes. The ships are fitted with a new type long exhaust muffler pipe, recessed into the bottom of the fuselage. It contains a spiral air-chamber silencer developed by the Maxim silencer company. All tail and control surfaces as well as fuselage fairing is of stamped alclad.

Five-Place Biplane

Gates-Day Aircraft Corp., another new company, showed its "Standard" five-place open-cockpit biplane with OX engine. The passenger cockpit is of four-place capacity. A dural girder fuselage is a structural feature of this ship.

One of the exhibits of more than usual interest was that of the General Airplanes Corp. of Buffalo, which has been developing a line of planes for about a year. The ship shown, the "Aristocrat," is a rather clean three-place cabin monoplane. It is somewhat reminiscent of both the Bellanca and Fairchild planes, and evidently an endeavor has been made to combine the best features of a number of different types. Some of the novel features are a full cantilever landing gear, a micarta spring-controlled tail-wheel, an adjustable stabilizer and a hinged motor mounting to permit of access to the accessories.

In addition to this ship, General Airplanes will also manufacture a two-engined 10-place "observer" for Government work, a three-Wasp "Pullman" for transport work, accommodating from 14 to 17 passengers, and a single Cyclone-engined eight-place "Courier" with a speed of around 150 m.p.h., for high-speed transport work.

In addition to its Super-Universal, the Fokker Aircraft Corp. of America showed its new Amphibian for the first time. It is of the flying boat type of construction, with the retractable landing gear built into duralumin pontoons, which move with the landing gear, dropping down slightly when using the wheel, thus providing some additional bracing.

These stub wings are slightly ahead of the main wing leading edge, giving them a negative stagger and thus assisting in a quick take-off from water. A six-place passenger cabin, fitted out with many items of de luxe equipment, is supplemented by a two-pilot compartment of the closed type. Wings are of the

standard Fokker construction, but the hull is entirely of dural. It is powered with either a Wright Cyclone or P & W Hornet, located above the wing and of the pusher type, with three-bladed propellers.

The Great Lakes Aircraft Corp. of Cleveland (until recently the Glenn L. Martin Co.), now controlled by William Robert Wilson, formerly president of the Murray Body Co., exhibited a skeleton plane and pontoons of dural girder construction throughout. This ship showed the application of the Eureka section girder.

All-Metal Hamilton Plane

One of its H-45 cabin planes of all-metal design was exhibited by the Hamilton Metalplane Co. To indicate that this ship can be used also for seaplane work, a pair of pontoons designed for the plane were also shown. This ship was described in connection with the Detroit Aircraft Show. One change recently made in it consists in an increase of 6 in. in the height and width of the cabin.

An exhibit which attracted a good deal of attention was that of the Heath Airplane Co., consisting of a little parasol monoplane with four-cylinder Henderson motorcycle engine. The price of this ship complete is $975, while a complete bill of material is available for $199. It was the smallest ship at the show, and, of course, is a single-seater.

In place of the 20-passenger "Patrician" commercial transport, which was damaged by fire recently while on the ground, just after completion, Keystone Aircraft Corp. showed one of its high-duty bombers, the "Pirate." In addition, a Loening Air Yacht was shown, since the Loening and Keystone companies were recently merged. The latest Air Yacht is fitted with the Wright 525-hp. Cyclone; its cabin accommodates six, and its cruising speed has been raised to 110 m.p.h.

Star Aircraft "Cavalier" two-passenger cabin ship

Kreider-Reisner Aircraft Corp. showed a three-place open-cockpit, conventional single-bay biplane with Comet engine. The ship is called the Challenger and seems to be of rugged construction. Mahoney-Ryan Aircraft Corp., builders of the Spirit of St. Louis, exhibited their latest six-place dual control Brougham.

A six-place closed ship was also exhibited by Laird. Of the biplane type, its upper wing is well above the fuselage, for better efficiency. It is powered with a Wasp, and has a pyralin side window in the fuselage ahead and below the pilot.

Mohawk Aircraft Corp. showed its Pinto monoplane described in connection with the Detroit Show. A conventional three-place single-bay biplane with OX engine and radiator above the upper wing, was shown by the Monarch Aircraft Corp. The Mono Aircraft Corp. enters 1929 with a line of three airplanes, the well-known Monocoupe, a new training plane and a four-place cabin job. All three ships are of the semi-cantilever monoplane type. They are priced at $2,675 for the Monocoupe, and the Monoprep, the training plane, and $6,500 for the Monocoach. All three are powered with Velie engines.

A DeHavilland Moth, fitted with a DeHavilland Gipsy 85-100-hp. four-cylinder in-line air-cooled engine, was exhibited by the Moth Aircraft Corp., American distributors. This ship is England's best known private ship.

Phantom Knight Aircraft Corp. showed a three-place open single-bay conventional biplane, and Paramount Aircraft a four-passenger cabin monoplane of conventional structure with Warner engine and an automobile type hinged cowl. The upper wing in this ship is also well above the fuselage.

One of its Super Mailwings, now used on seven contract airmail lines, was exhibited by Pitcairn Aircraft, Inc. Fuselage longerons and engine mounting are of square sectional steel tubing. The pilot's seat is quickly adjustable. Top speed is 128 m.p.h. An interesting feature of the engine installation is the exhaust manifold, which is sunk into the engine cowling, thus reducing head resistance.

Sikorsky exhibited its twin-Wasp-engined amphibian which has attracted a good deal of attention of late. Accommodations are provided for eight passengers and two pilots. In general design the ship is a bi-plane of the flying boat type.

Two of its Red Arrow open-cockpit sport planes, of the two-place type, were exhibited by Simplex Aircraft Corp., both being fitted with Michigan Screw Machine Co. inverted "Rover" engines, the use of inverted engines making for good visibility.

The new Star Aircraft Corp. exhibited a two-passenger cabin monoplane powered with the Velie 60-hp. engine, and priced at $2,985. Its weight is stated to be only 780 lb., and its useful load capacity 575 lb. Top speed is claimed to be over 100 m.p.h.

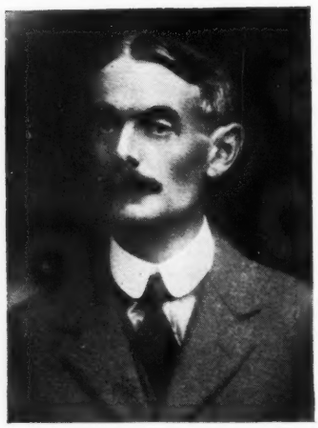
The Stearman Aircraft Corp. exhibited its line of airplanes, which were described in connection with the Detroit show. Stinson Aircraft exhibited a Detroiter and a junior cabin monoplane, of well-known design. Stinson School of Aviation, unrelated to Stinson Aircraft, showed its Aircoupe monoplane with Warner engine.

In addition to its standard models, the Swallow Airplane Co. exhibited a new primary training plane, the TP, modeled after the PT-1, priced at $1,795 less engine. It is strictly conventional and is designed for a low landing speed and maximum strength rather than performance. Szekely Aircraft Corp. showed a skeleton of a sport monoplane of steel tubing which this company is designing around its three-cylinder, air-cooled engine.

One of the best-known companies in the business, producing commercial planes exclusively, the Travel Air Mfg. Co., exhibited three ships, two of its three-place open and one Model 6000 cabin monoplane, developed from the Model 5000, which Art Goebel used to win the Dole Honolulu race. It is of the six-place type with 1000-lb. pay load rating.

Chance Vought Corp. announced its intention of becoming active in the commercial field by showing one of its Corsairs as a land plane, with the interchangeable float gear for seaplane use.

In addition to these planes there were also exhibited two Ford tri-motor transports by the National Air Transport, a Lockheed Vega cantilever monoplane of the now well-known plywood monocoque construction, and a Wallace Touroplane, a four-passenger cabin-type braced monoplane with OX engine.



Henry M. Crane

Cars *and* Airplanes

Close relationship between automotive and aeronautic engineering pointed out at conference in Washington.

AMONG the papers presented at the International Civil Aeronautics Conference in Washington, D. C., this week was one by Henry M. Crane, technical assistant to the president, General Motors Corp., which is of special interest to automotive engineers. Mr. Crane took for his subject, "Automotive Engineering and Its Relation to Aeronautics," and traced the many parallels which exist in automotive and airplane production, from the drawing board to the finished product. As he points out, the industries are so closely related that each benefits directly from the discoveries and development of the other. His paper follows:

There are now in general use, on land, on water and in the air, vehicles of transportation of such simple mechanism that the entire control is safely vested in the hands of one person having little or no technical knowledge. These may be properly defined as automotive vehicles, and their development has been largely due to the development of the internal combustion engine. Automotive engineering relates to the underlying theory, the practical design and the construction of vehicles of this type.

The field covered ranges from the motorcycle, the motor boat with outboard motor, and the baby airplane weighing a few hundred pounds, on the one hand, to the high-speed motor bus, the rail car, the fast cruiser and the giant airplane on the other hand. Successful engineering in each one of the three branches is becoming every day more dependent on knowledge gained in the other two fields.

Covers Wider Range

During recent years it is becoming better understood that what is called "engineering" covers a much wider range of human knowledge and thought than was commonly believed to be the case. It begins in research in all possible branches, including the fundamental theory of engines to produce power, the characteristics of all materials of construction and methods of construction, and the primary source of power in the form of some type of fuel, together with the theory of combustion.

The second branch of engineering is the application of knowledge gained by past experience or by research to the actual design of automotive vehicles. The third branch of engineering covers methods and details of construction. The fourth branch deals with the test of the finished design as to performance. The fifth deals with the economic use of the vehicle in actual service; and the sixth, with the maintenance of the vehicle. The latter two branches are in many respects so closely related as to be frequently treated as one.

The automotive engineer has a legitimate interest also in features of engineering pertaining to the use of his product in the construction of highways, airports and other utilities. His interest also extends into the production of raw materials and semi-finished and component parts. There are very few materials in commercial production today that are not of actual service and real interest in the building of automotive vehicles.

The power available to drive them was at first small, but with increasing engineering knowledge has developed to the point where today units of over 500 hp. are commonplace, both on water and in the air, and can be handled even more readily than the much lower powered machines of 10 years ago.

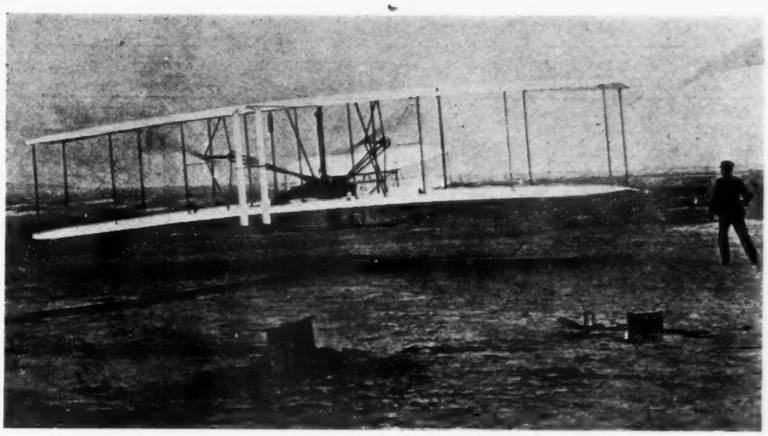
Same Type of Powerplant

One structure common to all types of automotive vehicles is the powerplant, which usually today is a light, compact engine burning a hydrocarbon fuel, either in the form of a liquid or of a gas at atmospheric temperature and pressure. There are still a few vehicles employing steam as an intermediary in the production of power; but the great majority burn the fuel directly in the cylinders. At the moment the fuel almost universally used is a petroleum distillate modified by the addition of other fuels or of substances having a desirable effect on combustion. The enormous demand for liquid fuel for use in motor car engines has justified the expenditure of huge sums of money to improve refining methods and in research to develop a fuel better adapted for such use.

While practically everything that has been done in the way of research and improved production of fuel has been primarily for motor car use, a direct benefit has accrued to the other two automotive branches. Although the optimum fuel for aviation use is not the same as the optimum fuel for motor car use, the two are produced side by side, using knowledge gained in a common field of research. The two elements of major importance in petroleum fuel are volatility and detonating quality. It is interesting to note that the detonating quality of fuel first became of obvious importance during the war because of the great increase in aviation, and that the development of anti-knock quality and anti-knock materials has been carried on since the war largely under the influence of motor car demand.

While the aviation engine of today of the radial air-cooled type bears no very close resemblance to the modern motor car engine, it is yet constructed almost entirely of materials originally developed for motor car use and is equipped with magnetos, spark plugs, carburetors and ball and roller bearings developed primarily for that field of service. Of course, there are still aviation engines in production and service having a much closer

Alike in *Engineering* Problems



The first flight: This photograph, taken at Kitty Hawk, N. C., in 1903, shows the first successful airplane flight. It was made by the Wright brothers and the International Civil Aeronautics Conference in Washing this week is in commemoration of the event

resemblance to the conventional motor car engine than the radial type just mentioned. Meanwhile, the motor car industry has benefited in a very direct way from the engineering of aviation engines. Extravagant ratios of stroke to bore proved to be undesirable under the relentless test of a search for power with low weight. The motor car industry is now benefiting greatly from the knowledge thus developed. The motor car spark plug is provided with infinitely better porcelain today because of knowledge gained during the war in an attempt to meet aviation engine requirements. Much of the technique in piston rings, piston and valve design and in lubrication systems developed in aviation practice has proved to be of great value in the automotive industry. The very common use of high chromium exhaust valve material in motor cars may be cited as an instance. Supercharging is being developed side by side in motor cars and airplane engines. The problem of uniform fuel distribution in multi-cyclinder engines is common to all types.

Boats Use Aviation Engines

In the motor boat field, one only needs to call attention to the fact that practically all of the larger racing motor boats are powered with aviation engines, while many of the smaller boats use slightly modified motor car engines. It is perhaps needless to point out that some of the most successful makers of aviation engines were originally producers in the motor car field. There are, of course, many well-known exceptions but the fact is simply stated to emphasize the extremely close relationship between engineering and production in both branches.

In studying the complete operated vehicles in the three branches, the engineering parallel is less apparent; but a parallel does exist very markedly in methods of production, though somewhat less markedly in general design. Twenty-five or 30 years ago when speeds on the water were usually in the order of 20 miles per hour or less, and on land, 40 miles per hour or less, the importance of wind resistance in vehicle design was naturally ignored. Today, however, speeds both on land and on the water have advanced to a point that makes a study of wind resistance of great importance if economic use of power is to be arrived at. As a result of this, one manufacturer of airplanes is producing motor boat hulls for use with outboard motors, while all the racing motor cars are designed with the greatest possible attention to air resistance — often being subjected to wind tunnel tests in the process. Air resistance has not been treated with sufficient consideration as yet in the design of passenger vehicles, but its importance is gradually becoming recognized.

The high-speed motor boat has been a contributor to aviation engineering in the design of airplane hulls and pontoons. The motor car has contributed to aviation the wire wheel, the balloon tire, the landing wheel brake and some form of spring struts of the shock absorber type for landing gears.

In the production, especially in quantity, the interrelationship between the three types of vehicles is extremely close in spite of the great difference in appearance. The handling of thin sheet metal, with fabrication and assemblage by welding or riveting, or otherwise, is of fundamental importance to all branches. Bolts, nuts and rivets are important factors in construction. The motor car industry was forced to design a new standard in bolts and nuts as an improvement over the old United States standard, which was based on the use of cast iron and mild steel. This standard has proved to be of value in aircraft construction and the influence of its use in aircraft by bringing out a higher quality of product has reacted on the quality now available in the motor car. Improved methods of measuring thread shape by optical means or otherwise have gone hand-in-hand with the tap which is ground after hardening and is therefore capable of making a much more accurate product.

Development of Pyroxylin

One of the most outstanding advances in the motor car industry in recent years was the introduction of pyroxylin as an exterior finish. The automobile industry owes this advance primarily to the production of various dopes for aviation use during the war.

Among many uninformed people there is a feeling that the motor car and the airplane are directly competitive means of transportation and that an advance in one field must be accompanied by a corresponding loss of business in the other field. Nothing could be further from the truth. Each vehicle is supreme in its own field and the two will progress together, engineering improvement in one industry being promptly reflected by a similar improvement in the companion industry.

First with the News

Reliable and Accurate

News of the Industry

PAGE 880 VOLUME 59 *Philadelphia, Saturday, December 15, 1928* NUMBER 24

Plants Increase Operations on New Model Production

PHILADELPHIA, Dec. 15.—Manufacturing operations in car and truck factories are continuing at approximately the November rate with some tendency to increase as a large number of companies swing into production on 1929 models. Operations on the new cars are gradually increasing and large scale production will be effective toward the end of the month to provide dealers with stocks for prompt deliveries after January 1.

Reports from many points indicate that Ford dealers generally have reduced their back orders on some models to a point where practically immediate deliveries can be made. Some models still are sold from 30 to 60 days ahead but in some sections the Ford retail situation has reached a point where large current sales must be made to meet the increased rate of factory operation.

Retail sales in most sections of the country are remaining at a high seasonal level with reports of large banks of orders being built up for 1929 delivery on some of the new cars now showing. The used car situation is generally satisfactory and dealers are applying increased sales pressure.

Ford Adds Models, Truck Prices Up

DETROIT, Dec. 13—Introduction of taxicab and town car models on the Model A chassis, and price increases on its line of commercial cars, are announced by the Ford Motor Co. The Ford town car, designed to be chauffeur driven, lists at $1,400 and the taxicab at $800. The cab provides a rear seat which comfortably seats three passengers while a fourth can be accommodated on an auxiliary seat which folds up against the driver's seat. Production of both the town car and taxicab models is already under way.

The Ford company is also producing a limited number of its commercial vehicles with bevel gear rear axles.

The company has effected the following price increases: Model A chassis from $325 to $365. Pickup body truck with open cab from $395 to $455; pickup with closed cab from $445 to $495. The company has also introduced a panel delivery listing at $615.

Rim Output Gains 50% in November

CLEVELAND, Dec. 11—Rim production in November totaled 1,213,245, an increase of almost 50 per cent over production in the same month last year, according to the Tire & Rim Association of America, Inc. The total output for the first 11 months was brought to 23,146,089, more than a 4,200,000 gain over 1927 for the same period when output totaled 18,877,634.

Passenger car rim production in November passed the 20,000,000 mark, the total for the 11 months being 20,043,401 which compares with 16,894,580 in the same period last year. November passenger car rim production was 910,670 as against 699,908 in November, 1927. Truck rim production in the 11 months' period was 2,992,663, a gain of almost 1,000,000 over the 1927 period. November truck rim production was 298,991 as against 137,929 in the same month last year.

Gardner Places Two Orders

ST. LOUIS, Dec. 11—Gardner Motor Co. has released commitments for 2000 sets of wheels and the same number of sets of electrical equipment, Russell E. Gardner, president, has announced. Motor Wheel Corp. will supply the wheels, and Delco-Remy Co., the electrical equipment.

Adds Research Department

WARREN, OHIO, Dec. 14—Packard Electric Co. has formed a special research department to provide the aviation industry with proper electric cable equipment to meet numerous requirements. Among the new cables developed recently is the Packard Lac-kard ignition cable.

$25,000,000 Company to Finance Aviation

CHICAGO, Dec. 10—North American Aviation, Inc., has been formed with a capitalization of 6,000,000 shares and an initial paid-in capital and surplus of $25,000,000 to develop the aviation industry in the United States. Public offering of 2,000,000 of the shares has been made.

On the executive committee are C. M. Keys, president of Curtiss Aeroplane & Motor Co., Inc., who will assume active charge of the new company; J. C. Cowdin, C. W. Cuthell, L. A. Kennedy, J. A. B. Smith, G. A. Tompkins and J. C. Willson.

Wilson Foundry Installs $200,000 Conveyor System

DETROIT, Dec. 11—The foundry of the Wilson Foundry & Machine Co. has shut down while Webb Mfg. Co. is installing a new $200,000 conveyor system. The foundry will be reopened as soon as the installation work is completed, probably next Monday, according to D. R. Wilson, vice-president and general manager.

The new conveyor, about 1000 ft. long, is of continuous operation type and will carry about 2500 castings daily from the foundry to the cleaning department of the new machine shop.

The new conveyor will be one factor in making it possible for the company to increase production 30 per cent to 400,000 engines next year. When the foundry is reopened next week the stepping up of production will begin immediately. It is planned to have the foundry on a 40,000-engine-a-month schedule by the last of February.

Stewart Improves Engine

BUFFALO, Dec. 12—Stewart Motor Corp announces several engine improvements on Models 18X—2½ ton; 19X—3 ton, and 22—4 ton. Without changing the bore and stroke on the above models, it has been possible to increase the power approximately 10 per cent by the use of counterweights on the crankshaft.

Hupp Officers Take Chandler Positions

Young is Named President and Six Directors Replace Chandler Group

NEW YORK, Dec. 11—All officers and directors of Chandler-Cleveland Motors Corp. resigned at a stockholders' meeting this week and were succeeded by officers and directors of Hupp Motor Car Corp. DuBois Young, president of Hupp, was elected president of Chandler-Cleveland and the following were elected to the board of directors: C. D. Hastings, J. Walter Drake, H. J. Halle, Moritz Rosenthal, Arthur Von Schlegell, Robert C. Shaffner, John Sherwin, Jr., and Charles L. Bradley.

The new management will continue the present line of Chandler cars, which will be sold through the present Chandler-Cleveland distributors.

Ayres Sees Record Output in First-Half of 1929

CLEVELAND, Dec. 12—With automobile production reaching record-breaking proportions in the first and second quarters of 1929, Col. L. P. Ayres, vice-president of the Cleveland Trust Co., said the effort to market this output would bring the greatest competitive struggle in the history of the industry. The statement was made by Colonel Ayres in connection with his annual forecast to the industry given to the Cleveland Automobile Manufacturers & Dealers Association. He said further:

"This industry has a capacity of 7,000,000 cars and early production plans indicate that manufacturers will attempt to produce that total for a market which has shown repeatedly that it is able to absorb annually about 4,500,000 cars. The contest which will result will make acute the question of trade-ins."

He predicted that tire consumption in 1929 would break all records.

A.A.A. Technical Board to Act on 1930 Racing Cars

WASHINGTON, Dec. 12—The American Automobile Association has named the following technical committee for 1929: Col. W. G. Wall, president of the Society of Automotive Engineers, chairman; S. G. Baits, chief engineer Hudson Motor Car Co.; H. F. Blanchard, technical editor, Motor; A. E. Dewaters, chief engineer Buick Motor Co.; Paul Dumas, technical editor, Chilton Class Journal Co.; T. J. Litle, Jr., chief engineer Marmon Motor Car Co.; F. E. Moskovics, president Stutz Motor Car Co. of America, Inc.; D. G. Roos, chief engineer Studebaker Corp. of America; H. C. Snow, chief engineer, Auburn Automobile Co.; George Stephenson, mechanical engineer; Col. J. G. Vincent, vice-president, Packard Motor Car Co.; E. Von Hamback, chief engineer, Boyle Valve Co., and Frank E. Watts, chief engineer Hupp Motor Car Corp.

A meeting of the committee will be held in Detroit, Dec. 18, with Capt. E. V. Rickenbacker, chairman of the contest board, manufacturer representatives, and leading racing drivers, to formulate specifications covering the 1930 racing cars.

Parts Builders See Sales Gain in '29

NEW YORK, Dec. 11—Bright prospects for business in automotive parts and accessories were reflected at group meetings of members of the Motor & Equipment Association held in New York on Dec. 6 and in Detroit on Dec. 7. Sales executives of a number of non-competing companies were present at these sessions which were arranged by the sales development department of the M.&E.A. under the direction of Neal G. Adair.

The discussions emphasized the increasing patronage of parts specialists by car and truck makers, including a number of the latter who had previously made a large percentage of these units in their own plants. It was shown that vehicle makers were taking more advantage of the facilities of the parts makers, because of excellence of products, low cost and flexibility in changing from one design to another.

Henney Company Now Allied Motor Industries

CHICAGO, Dec. 10—Stockholders of Henney Motor Co. have voted to change the name to Allied Motor Industries, Inc. The company will operate as a holding company controlling automotive and aircraft subsidiaries. The hearse and ambulance business will be transferred to a new subsidiary, the Henney Motor Co. of Illinois, the stock of which will be owned by Allied Motors. The company also owns the Weatherproof Body Co., two-thirds of the 300,000 shares of common stock of the Great Lakes Aircraft Corp., and recently acquired Elgin Clock Co.

Elgin Becomes Van Sicklen

CHICAGO, Dec. 13—The name of the Elgin Clock Co. has been changed to the Van Sicklen Corp., by Allied Motor Industries, Inc. N. H. Van Sicklen, Jr., will be president of the reorganized company. An arrangement has been made with the Haskelite Co. whereby sales rights for the major part of the company's automotive products are conveyed to the Van Sicklen company. Haskelite manufactures stamped plywood paneling.

Galesburg and Borg-Warner in Deal

CHICAGO, Dec. 13—Confirmation that negotiations for the consolidation of Galesburg Coulter Disk Co. with the Borg-Warner Corp. are nearing completion was given yesterday by R. C. Ingersoll, president of Galesburg.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

NEW YORK, Dec. 14—Retail trade has responded to the stimulation offered by the more seasonable weather, while industry is operating at a higher level than at this time last year. Holiday buying has started earlier than usual and, from all indications, such buying this year will be very heavy.

CHAIN STORE SALES

Sales of 25 store chains during November were 18.5 per cent above those in the corresponding month last year, while sales of these same store chains for the first 11 months of the current year increased 16.4 per cent above sales in the corresponding period in 1927.

FREIGHT CAR LOADINGS

Car loadings for the week ended Nov. 24 amounted to 1,028,690 cars, which represents a decrease of 31,011 cars below those in the preceding week but an increase of 188,048 cars above those in the corresponding period last year.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended Dec. 8 stood at 97.1, which compares with 97.3 for both the week before and two weeks before.

BANK DEBITS

Bank debits to individual accounts outside of New York City for the week ended Dec. 5 were 2 per cent above those in the similar week a year ago.

FEDERAL RESERVE REPORT

The consolidated statement of the Federal Reserve banks for the week ended Dec. 5 shows an increase of $21,900,000 in holdings of discounted bills, and decreases of $4,600,000 in holdings of bills bought in the open market and of $2,500,000 in holdings of Government securities. The reserve ratio on that date was 64.8 per cent which compares with 65.2 per cent the week before.

Loans and discounts of the reporting member banks during the same week increased by $107,000,000, and investments increased by $5,000,000.

Coolidge Speech Opens Aeronautic Conference

WASHINGTON, Dec. 12—Welcomed by President Coolidge, delegates from 40 nations met today at the International Civil Aeronautics Conference in the auditorium of the U. S. Chamber of Commerce for a general interchange of ideas, plans and projects to further aviation and a general review of developments to the present time.

President Coolidge told the assembled representatives from both continents that the world is looking forward to the day of extensive, regular and reasonably safe intercontinental and interoceanic transportation by airplane and airship.

Ford Raises Prices on Two Open Models

Increase of $65 is Made on Phaeton and Roadster—November Output 121,037

DETROIT, Dec. 12—Ford Motor Co. has raised prices on its phaeton model from $395 to $460 and has increased the roadster price from $385 to $450.

The company's production of cars and trucks total in November was 121,037 of which 105,891 were built in the United States, 7591 in the Canadian factory, and 7555 in all other foreign plants. Shipments in the first week of December were at the rate of 6435 cars daily, a gain of 400 a day over the first week of November.

The first anniversary of the Model A was observed Dec. 2, the company shipping 704,699 cars and trucks in the first year. Production estimates for the second year are for a total which will exceed the former production mark of 2,000,000 set up in 1924.

Issues European Prospectus

LONDON, Dec. 11—The prospectus for the new $35,000,000 British Ford company was issued today, inviting the public to subscribe for 2,800,000 ordinary £1 shares, about $14,000,000 or 40 per cent of the total capitalization.

The prospectus said that the Dagenham, England, factory, with a capacity of 200,000 cars annually, would be the largest in the world outside of the United States. It forecasts that 20,000 British and Irish workers will be employed at the Dagenham, Manchester and Cork plants.

The English directors include Lord Illingworth and Roland Kitson. The former is a director of the National Provincial Bank and the latter a director of the Bank of England. Other directors are Henry and Edsel Ford, C. E. Sorensen, Sir John T. Davies and Sir Percival Perry.

The average profits shown by the Ford European properties to be included in the new company in the past four years represent 13 per cent on the new company's capital. Last year with production suspended for five months, profits equalled about 7½ per cent.

Canada Plant to Build 140,000

DETROIT, Dec. 8—In the opinion of W. R. Campbell, vice-president and treasurer of the Ford Motor Co. of Canada, Ltd., 1929 will be the greatest year in Canadian automotive history. His company is scheduled to manufacture 140,000 new cars or 35,000 more than in any previous yearly record, he said.

Canadian Exports Rise 12%

WASHINGTON, Dec. 13—Canadian exports of motor vehicles for October showed a 12 per cent gain in number over September and a 176 per cent gain over October, 1927, the Department of Commerce announces. Exports of passenger cars and trucks totaled $3,941,208, a jump of 10 per cent in value over September, when vehicles valued at $3,574,374 were exported.

The average value of passenger cars exported from Canada in October was $430, as compared with an average value of $433 in September.

Factory and Dealer Events Scheduled for National Show Weeks

NEW YORK SHOW

Jan. 5	Studebaker Corp.	Dinner	7.00 P. M.	Commodore
Jan. 5-12	Hupp Motor Car Co.	Luncheons	12.45 P. M.	Commodore
Jan. 5-12	Locomobile Co.	Meetings	2.00 P. M.	Commodore
Jan. 7	Oakland Motor Co.	Dinner	6.30 P. M.	Penna.
Jan. 7	Rubber Association	Meeting	10.30 P. M.	Commodore
Jan. 7	Rubber Association	Dinner	7.00 P. M.	Commodore
Jan. 7	Amer. Auto. Assoc.	Meeting		Waldorf
Jan. 7	Nat'l Automobile Dealers Assoc.	Convention		Commodore
Jan. 7-8	Packard Motor Co.	Meetings		Roosevelt
	(Exclusively for Packard Distributors)			
Jan. 8	Auburn Auto. Co.	Luncheon	1.00 P. M.	Commodore
Jan. 9	Reo Motor Car Co.	Dinner		Hotel Astor
Jan. 9	Chrysler Sales	Luncheon	12.30 P. M.	Commodore
Jan. 9	Warren-Nash Motors	Luncheon	12.30 P. M.	Penna.
Jan. 9	Automotive Elec. Association	Meeting	10.00 A. M.	Hotel Astor
Jan. 9	Peerless Motor	Dinner	6.30 P. M.	Commodore
Jan. 9	Gardner Motor Co.	Luncheon	1.00 P. M.	Belmont
Jan. 10	Willys-Overland	Dinner	7.00 P. M.	Commodore
	(Admittance by card only)			
Jan. 11	Chevrolet	Meeting	1.30 P. M.	Mecca Temple
Jan. 11	Chevrolet	Banquet	6.30 P. M.	Mecca Temple

CHICAGO SHOW

Jan. 25	Chicago Auto Trade Association	Dinner	6.30 P. M.	Palmer House
Jan. 26-Feb. 2	Locomobile Co.	Meeting	2.00 P. M.	Blackstone
Jan. 26-Feb. 2	Hupp Motor Co.	Luncheons	12.45 P. M.	Stevens Hotel
Jan. 28	Studebaker	Dinner	7.00 P. M.	Palmer House
Jan. 29	Oakland	Dinner	6.30 P. M.	Palmer House
Jan. 29	Auburn	Luncheon	1.00 P. M.	Stevens
Jan. 29-30	Auto. Elec. Assoc.	Meeting	10.00 A. M.	Stevens
Jan. 30	Chrysler	Luncheon	12.30 P. M.	Congress
Jan. 30	Peerless	Dinner	6.30 P. M.	Congress
Jan. 30	Willys-Overland	Dinner	7.00 P. M.	Palmer House
	(Admittance by card only)			
Jan. 31	Reo	Dinner		Congress
Feb. 1	Chevrolet	Meeting	1.30 P. M.	Majestic Theater
Feb. 1	Chevrolet	Banquet	6.30 P. M.	Palmer House
Jan. 28-29	Nat'l Automobile Dealers Assoc.	Convention		Palmer House
Jan. 28-29	Packard Motor Co.	Meetings		Blackstone
	(Exclusively for Packard Distributors)			
Jan. 29	Nat'l Automobile Dealers Assoc.	Banquet		Palmer House
Jan. 30	Gardner Motor Co.	Luncheon	1.00 P. M.	Blackstone

Dodge Sales Gain 62.6%

DETROIT, Dec. 11—For the second month in succession, records for shipments of passenger cars and trucks from Dodge Bros. Corp. plants in the United States and Canada were broken in November. With an increase of 62.6 per cent in the deliveries to dealers over the corresponding period for 1927, a new high-production peak for any November in the history of the organization was reached. October deliveries also set a record for that month, when an increase of 6840 units over the same month a year ago were shipped from the plants of the company.

American Cirrus Company Prepares for Production

NEW YORK, Dec. 10—American Cirrus Engines, Inc., recently organized for the manufacture in this country of the British Cirrus airplane engine, plans to start immediately on the production of the British Mark 111 engine at a plant in Belleville, N. J. Men and machinery are being assembled at this plant under the direction of A. G. Lloyd, formerly assistant production manager of the Wright Aeronautical Corp., who will be in charge of production for the new company. Mr. Lloyd will be assisted by Clarence A. de Giers, consulting aeronautical engineer, and Prof. Alexander Klemin, director of the Guggenheim School of Aeronautics.

Curtiss Buys Reid

DETROIT, Dec. 10—Curtiss Aeroplane & Motor Co., Inc., has completed negotiations for absorption of Reid Aircraft Co., Ltd., of Montreal.

Higher Sheet Prices Now Rule, Say Mills

Little Resistance Offered by Important Customers to Advances in Statement

NEW YORK, Dec. 13—Automotive consumers apparently have covered their steel requirements over the old year's remainder and for the first-half of January, 1929. Relatively little fresh buying is noted, but this intermission in the demand had been generally looked for and causes neither surprise nor uneasiness. Sheet mills' order books show a comfortable backlog, a good part of which is said to consist of business done at the higher prices recently announced.

Some of this business covers shipments to be made after the turn of the year and some is subject to specifications to be furnished at buyer's convenience. Sellers assert that the higher sheet prices have become fully established and that the most important consumers offered little resistance to the advance. Some consumers, however, are still holding back in the hope that mills will be more eager for business after they have experienced a few weeks' lull in demand.

The new card of extras for hot-rolled strip steel comes in for much discussion, especially the division into two base classifications of widths of 6-in. and under and of over 6-in. up to 24 in. It has been pointed out that with a base price of 2.00 cents, Pittsburgh, for the narrower classification and of 1.90 cents for the wider, it will be cheaper for the buyer of 6-in. strip to take slightly wider material. The market so far has not been established on the 1.90 to 2.00 cent basis, round lot business having been booked $1 to $2 a ton under these levels.

Cold-rolled strip has been contracted for in some cases at 2.85 cents, Pittsburgh, for first-quarter, an advance of $2 a ton over the fourth-quarter contract price, but $2 under the nominal market quotation of 2.95 cents. Automotive consumers are seemingly in no haste to place orders, and a good deal of business is likely to be held over until after Jan. 1. Some first-quarter business for cold-finished steel bars has been placed at 2.20 cents, Pittsburgh.

Pig Iron—Prices show no change and considerable first-quarter tonnage remains to be covered. Automotive foundries are either provided with sufficient iron for the current month or buying in small tonnages.

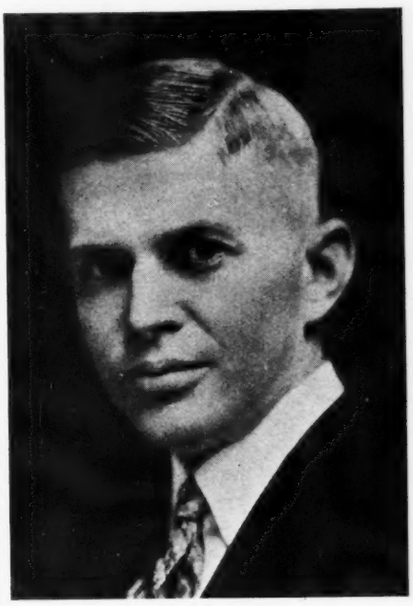
Aluminum—Routine conditions continue. Some first-quarter business is the subject of inquiry by consumers. Imports are light. Secondary metal interests report moderate demand from automotive consumers. Prices are entirely unchanged.

Copper—Domestic demand continues insistent and very little metal is thought to be held by consumers, this being in part due to a desire to keep inventories as low as possible at this time. The market rules firm, with the undertone portending a further hardening of prices.

Tin—Under the influence of London bear maneuvers the market eased off, contrary to the general expectation that beginning of trading on the National Metal Exchange would be the signal for advances. Heavy liquidation in London is likely to be followed by a more aggressive attitude on the part of the bull contingent.

Lead—The market is firm but rather quiet. Refiners have a large volume of orders on hand and rather welcome the lull in buying.

Zinc—With demand only fair, producers are satisfied to maintain previously quoted prices.



Aide to Sloan

C. E. Wilson, Delco-Remy president, who has been named assistant to A. P. Sloan, Jr., General Motors president

Peerless to Present New Straight-Eight Model

CLEVELAND, Dec. 10—Among the new models to be announced at the New York automobile show is said to be a straight eight produced by Peerless Motor Car Corp. It is well known in automobile circles that Peerless engineers have been working on such a car ever since early this year. According to advices received from the big factory in Cleveland, the new eight will be a car of exceedingly high quality with a wheelbase of around 135 in.

In addition to permitting a moderate price on the new eight for a car of its specifications, the new production system, together with the economies of quantity buying, has made possible a price under $1,300 for the new Six-61, the other Peerless model to make its bow in January.

Mansfield to Double Output

MANSFIELD, OHIO, Dec. 12—Mansfield Tire & Rubber Co. has started construction of an addition which will increase the company's output by 100 per cent, bringing the daily output to 10,000 tires a day.

Chevrolet Schedules 1,250,000 Production

Company Speeds Output of New Car to Permit Prompt Deliveries

DETROIT, Dec. 12—W. S. Knudsen, president and general manager of Chevrolet Motor Co., has outlined plans for a production of 1,250,000 cars and trucks in 1929. The 15 factories of the company are now working at top speed, he said, so that all dealers will have cars on display and ready for delivery by Dec. 29. The company would be in position to make early deliveries on the orders that have been placed during the advance showings of the cars, he said.

3153 Sold at Chicago Display

CHICAGO, Dec. 10—New Chevrolet records for attendance and sales were established at the Chicago advance showings of the new six in the Pure Oil Building and Palmer House.

According to L. K. Cooper, regional sales manager, 155,000 people viewed the exhibits. Chicago's opinion was reflected in 3153 orders for preferred delivery. This exceeds by a wide margin all former Chevrolet records in Chicago and according to Chevrolet officials, presages a new record.

Stockholders Authorize G.M. Stock Split-Up

WILMINGTON, DEL., Dec. 10—Stockholders of General Motors Corp. have authorized the issue of 75,000,000 shares of common stock of the par value of $10 each in place of an authorized issue of 30,000,000 shares of the par value of $25 each.

The stockholders also authorized the issuance of 43,500,000 snares of the new common stock of the par value of $10 each in exchange for the outstanding 17,400,000 shares of the old common stock on the basis of two and one-half shares of the new in exchange for each share of the $25 stock. Exchange of the old certificates for the new may be made on and after Jan. 7.

Morris N.A.F.C. President, Hanch General Manager

CHICAGO, Dec. 10—E. M. Morris has been elected president of the National Association of Finance Companies, O. Rey Rule, first vice-president; R. P. Babcock, second vice-president; C. E. Vesy, third vice-president; V. L. Brown, fourth vice-president; C. C. Hanch, general manager; W. G. Tennant, treasurer; J. W. Creekmur, counsel, and Milan V. Ayres, analyst. New directors are C. E. Vesy, V. L. Brown, B. H. Trippe, T. E. Courtney, William Frentz and A. L. Deane. The executive committee includes E. M. Morris, O. R. Rule, R. P. Babcock, V. L. Brown, C. E. Vesy, V. G. Dunnington, A. L. Deane, J. C. Allaback, Henry Ittleson, T. E. Courtney and W. G. Tennant.

Men of the Industry and What They Are Doing

Glancy and Tracy Talk in Oakland Movie Tones

The Oakland Motor Car Co. is employing movie tone films to instruct its dealer organization throughout the country. These films show A. R. Glancy, president, and W. R. Tracy, vice-president in charge of sales, in the act of addressing the groups before which the film is shown and at the same time conveys the words of Mr. Glancy and Mr. Tracy to the audience. These films are used for the presentations of sales ideas and facts and statistics.

Dealer meetings are being held at 30 key points by factory executives in introducing the new Pontiac. Heading the group which will swing down the Atlantic seaboard, are W. B. Sawyer, Eastern sales manager; W. E. Fellows, advertising manager, and Hugh Higginbottom, distribution manager. E. M. Lubeck, Western sales manager, and W. M. Chamberlin, manager of sales development, will cover the central West, while the Pacific Coast meetings will be conducted by R. B. Batchelder, assistant to W. R. Tracy, vice-president in charge of sales, and L. M. Dreeves, manager of the Pacific Coast region.

David on U. S. Board

Henry David of Wilmington, Del., has been elected a director of the United States Rubber Co., representing the duPont interests. William Wiseman of Kuhn, Loeb & Co., and Henry Rogers Winthrop of Harris, Winthrop & Co., were also elected to the board. Stockholders have approved changing the common stock from $100 par value to no par value.

Continental Appoints Harris

Sid Harris has been appointed industrial sales engineer in the East, of Continental Motors Corp. His past experience includes market research, sales promotion and sales engineering which covers both the manufacturing and publishing fields.

R. A. Graham Named Director

Ray A. Graham has been elected a director of Libbey-Owens Sheet Glass Co., and he will become chairman of the board. J. H. Perkins, president of the Farmers Loan & Trust Co., New York, also was elected a director. Stockholders approved the increase in the company's authorized common stock to 1,000,000 shares from 400,000.

Mahoney Joins Bendix

J. P. Mahoney has resigned as executive engineer of the Buda Co. to join the Bendix Brake Co. at South Bend. Mr. Mahoney had been with the Buda company for the past 14 years in engineering capacities.

Directs Plymouth Sales

A. Van Der Zee, advanced to director of sales of Plymouth Motor Corp.

Matheson Talks in St. Louis

C. W. Matheson, general sales manager of Dodge Bros. Corp., was one of five nationally known speakers appearing before a sales executives' conference at Hotel Statler, St. Louis, Dec. 5. Other speakers at the conference, held under the direction of the sales managers' bureau of the St. Louis Chamber of Commerce, were C. A. Bedell, Butler Bros., Chicago; William Sample, Phoenix Mutual Life Insurance Co., Hartford, Conn.; E. St. Elmo Lewis, Detroit, and R. C. Borden and A. C. Busse of New York University. While in St. Louis Mr. Matheson was the house guest of Phil H. Brockman, president of the St. Louis Automobile Dealers Association.

Harrigan Makes Argentine Survey

J. V. Harrigan, manager of the truck and bus division, General Motors Argentina, S. A., is returning to the United States for a business trip and short vacation. While in the Argentine, Mr. Harrigan completed a field survey, market analysis and detailed study of the entire Argentine Republic in connection with the future possibilities of the truck and bus business.

Adams Aid to C. T. Fisher

Fred L. Adams, who for the past 13 years has been connected with the trust department of the Security Trust Co., and who now is assistant vice-president of the Detroit & Security Trust Co., has resigned his position to become secretary to Charles T. Fisher with offices in the Fisher building.

Hertz and Cord Directors of Aviation Securities

Aviation Securities Corp., which will specialize in investment in aviation securities, has been organized by Chicago interests. Laurance H. Armour will be president of the company; John Wentworth, vice-president, and John J. Mitchell, secretary and treasurer. All of the outstanding 150,000 shares of stock have been subscribed at $23.50 a share.

Besides the officers of the company, the board of directors is composed of C. G. Cushing, P. E. Gardner, C. F. Glore, E. K. Hardy, Col. Paul Henderson, John Hertz, R. P. Lamont, R. R. McCormick, E. H. Reynolds, C. W. Seabury, J. R. Thompson, W. B. Wolf, William Wrigley, Jr., all of Chicago; E. L. Cord, president of Auburn Automobile Co., A. H. Richards of Cleveland, and C. M. Keys and J. C. Willson of New York.

Chiron Coming to U. S.

Louis Chiron, automobile race driver, winner of the European Grand Prix at Monza, San Sebastian Grand Prix, and other events this season, will sail for the United States Dec. 18. In addition to attending the New York automobile show, it is Chiron's intention to visit American tracks with the possibility of taking part in races in the United States next year.

Wheeler Joins Black-Bigelow

George F. Wheeler has joined the staff of Black & Bigelow, Inc., air transport engineers of New York. Mr. Wheeler was assistant to the chief engineer of Pan-American Airways, Inc., and business manager of New York Airways.

Houde Officers Continue

BUFFALO, Dec. 14 — Claire L. Barnes, president of the Houdaille Corp., which has purchased the capital stock of the Houde Engineering Corp., has announced that there will be no change in the operating staff or general policies, A. B. Shultz remaining as president; W. A. Glare as vice-president in charge of sales, and Ralph Peo, vice-president in charge of production.

Young Heads Dinner Committee

NEW YORK, Dec. 10—The National Automobile Chamber of Commerce has appointed the following committee to make plans and arrangements for the annual banquet to be held Jan. 8: Dubois Young (Hupp), chairman; E. T. Strong (Buick), W. S. Knudsen (Chevrolet), Martin L. Pulcher (Federal), A. R. Erskine (Studebaker), Edsel Ford (Lincoln), and Charles W. Nash (Nash).

35 Nations Guests at New York Show

Trade Conference Will be Held Preceding Show to Plan Cooperative Work

NEW YORK, Dec. 8—Plans for international day, Jan. 7, to be held in connection with the national automobile show, were disclosed by John N. Willys, chairman of the export committee of the National Automobile Chamber of Commerce at the directors' meeting this week. Representatives from some 35 nations are expected to attend as guests of the chamber.

Preceding the opening of the show there will be a trade conference at the chamber offices where the benefits of team work among dealers, financial retail sales and profitable used car selling will be among the topics of discussion.

"The growing friendships of automotive groups in all lands is emphasized by this conference," said Mr. Willys. "We are coming to realize increasingly that the major task of the motor industry is to stimulate the use of motor transportation, to reduce the cost of transportation to the consumer and to promote the world-wide employment of the automobile as a general utility. As these aims are progressively achieved the markets for all types of motor transportation will increase and benefit all manufacturers, regardless of nationality."

Among the leading citizens from abroad who are coming to the event are Henri Cezanne, general manager of the French Automobile Manufacturers Association and of the International Association of Automobile Manufacturers; Dr. Allmers, president of the German Automobile Manufacturers Association, and Alfred Hacking, general manager of the Society of Motor Manufacturers and Traders of Great Britain.

Austria to Double Registration

NEW YORK, Dec. 10—W. Boeckl, a director of the Automobile Club of Austria and also a director of the Association of Highways in Austria, is now in this country. He came here as official delegate from Austria for International Day at the automobile show in New York and is putting in his time intervening between now and the New York show in studying American mass production of roads at Washington.

Mr. Boeckl says that by the end of 1928 motor vehicle registration in Austria will be 40,000 as compared with 25,000 in 1927. He looks for an increase to 80,000 registrations next year.

Autopulse Corporation Starts on New Models

DETROIT, Dec. 10—Formation of the Autopulse Corp., a $200,000 company to manufacture the Autopulse automatic electric fuel pump, is announced. It has purchased machinery and good will from Ireland & Matthews, Detroit, and has begun operations on the 1929 model pumps in its new plant here. Officers of the company are: P. A. Kempt, president; J. T. Wing, vice-president, and Frank H. Whelden, secretary and treasurer.

New models carry these improvements: Double pumping capacity; single or two-wire system; positive spring suspension and frictionless bearing; rigidly built armature; self-contained mirror-faced bakelite valves.

Bohn Aluminum Books New $16,000,000 Contract

DETROIT, Dec. 8—Bohn Aluminum & Brass Corp. has booked advance business indicating a substantial increase in sales and earnings for 1929. New business includes one contract with a leading manufacturer which totals $16,000,000. Bohn also has closed a contract for a total of $1,000,000 covering aluminum parts for radios for a leading manufacturer in that field. An appreciable swelling in Bohn's export business is also promised, a large order having been placed by a leading European manufacturer.

Bohn Aluminum earned net profit in the nine months to Sept. 30 of $2,472,087 or $7.06 a share on 3,500,000 shares of common stock against $879,083 or $2.51 on 349,136 in the same period last year. The nine months' earnings were more than double those of the entire year 1927 when net was $1,181,606, and exceeded the combined 1927 and 1926 earnings by over 20 per cent.

Aircraft Opportunities Surveyed by M. & E.A.

NEW YORK, Dec. 8—Opportunities in the aircraft industry for manufacturers and wholesalers of automotive equipment are covered in a preliminary survey of the aircraft market which has just been sent to the members of the Motor & Equipment Association.

The survey was conducted under the auspices of the former Motor & Accessory Manufacturers Association and summarized aircraft registrations, airport locations, sources of supply for aircraft manufacturers, operators and service stations, shop equipment commonly used, and parts and accessories and supplies most frequently demanded at flying fields. Experiences of automotive wholesalers in supplying the aircraft market in their vicinities are also summarized.

Gardner Sells Branches

ST. LOUIS, Dec. 13—Gardner Motor Co. has sold the Gardner Motor Sales Co., the organization that handled wholesale branches in Chicago, Cleveland and Boston, to the L. Markle Co. at Chicago, the Gardner Ohio Co. in Cleveland and A. J. Shorey & Associates in Boston. The company expects a considerable increase in sales volume in these three points under the new plan of operation now being developed at the factory.

Financial Notes

Evans Auto Loading Co. has declared a stock dividend of 4 per cent for the year 1929, payable 2 per cent April 1 and 2 per cent Oct. 1. Stockholders have voted to increase the common stock from 200,000 to 300,000 shares, to take care of expansion in the battery separator business. Stockholders of record Dec. 21 may subscribe for 20,000 shares at $40 a share in the ratio of one new share for each 10 held.

International Harvester Co. stockholders have approved increasing the common stock to 6,000,000 no par shares from 1,300,000 $100 par shares, preliminary to a four for one split-up. The new stock will be placed on a $2.50 annual dividend basis. The old stock paid $6 annually with semi-annual 2 per cent stock dividend payments.

Lakey Foundry & Machine Co. has declared the regular quarterly cash dividend of 50 cents and a stock dividend of 10 per cent, payable 2½ per cent quarterly. The cash dividend and the first instalment of 2½ per cent on the stock dividend are both payable Jan. 30 to stock of record Jan. 15.

Midland Steel Products Co. has declared the usual extra dividend of 48 cents per share on common stock and of $1 on preferred in addition to the regular quarterly of $1 on common and $2 on preferred. All dividends are payable Jan. 1 to stockholders of record Dec. 20.

Muskegon Motor Specialties Co. has placed on the market a new issue of 62,500 shares convertible Class A stock at $29.50 a share. This stock will be entitled to cumulative dividends at the rate of $2 a share annually and has full voting power.

Jackson Motor Shaft Co. directors have declared an extra dividend of 30 cents a share in addition to the regular quarterly dividend of 30 cents a share. Both dividends are payable Dec. 28 to stockholders of record Dec. 15.

Hayes Body Co. has declared an initial quarterly dividend of 75 cents on 250,000 shares of no par stock, payable Jan. 1, 1929, to stock of record Dec. 24, placing the stock on a $3 basis.

Bohn Aluminum & Brass Corp. has declared an extra dividend of 50 cents and the regular quarterly dividend of 75 cents. Both dividends are payable Jan. 2 to stock of record Dec. 15.

Timken-Detroit Axle Co. has declared an extra of 5 cents and a regular dividend of 15 cents on common, both payable Dec. 31 to stock of record Dec. 20.

Waukesha Motor Co. has declared an increased dividend of 75 cents from the former 62½ per cent payable Jan. 1 to holders of record Dec. 15.

Stromberg Carbureter Co. has increased its regular quarterly dividend of 75 cents payable Jan. 2 to holders of record Dec. 18.

Stutz Motor Car Co. of America, Inc., stockholders have approved increasing the capital to 400,000 shares from 263,000.

Oakland Axle Plant Speeds Productivity

New Equipment Includes 700 Machines and Mile of Overhead Conveyors

DETROIT, Dec. 4—The Oakland Motor Car Co. expansion program is nearing completion with the opening of the new axle plant. This plant is located in the former Oakland engine and sheet metal factory, which has been completely remodeled and reequipped for the new work, the stamping and engine building operations having been removed to the new centralized Oakland-Pontiac group of buildings.

The axle division comprises 260,000 sq. ft. of floor space which will be utilized for a capacity production of 1300 front and rear axles and 700 sets of differential gears for both Oakland and Pontiac cars daily. Prior to the opening of this plant, axles and gears were manufactured elsewhere and shipped to Pontiac.

Several million dollars' worth of new precision machinery was installed in the axle division. The equipment includes about one mile of overhead conveyors and 700 new machines. According to A. R. Glancy, president and general manager, equipment in the axle plant is of the most advanced type. New machinery will enable one man, who formerly could weld only 50 axle housings an hour, to turn out 200 an hour. Mr. Glancy states that while the productivity of one man is thus speeded up 400 per cent, a new process in welding is improving the quality of the finished product by 100 per cent. The axle plant will consume, at capacity, one hundred tons of steel daily.

In its new location, adjacent to the Oakland All-American assembly line, the stamping plant occupies 250,000 sq. ft. of floor space—four times that available in the old building. Employment has been increased 50 per cent and steel consumption is 350 tons a day.

Completing Foundry Units

With the removal of the stamping presses and the engine building machines, and the opening of the axle plant, the only major Oakland-Pontiac development still now under way is the construction of the new grey iron foundry. The first of the six units of the foundry has been completed and several others are nearing their finished form. The cleaning building, one story high and 20 by 270 ft., was the first one finished, and steel work is practically completed for the foundry proper, a building 260 by 247 ft. in size and the equivalent of two stories high.

Equipment is being installed in the foundry units as fast as they are completed, with the expectation that production will get under way by February. The foundry will have a pouring capacity of 450 tons of castings daily and will employ up to 700 men.

Bay State Conscience on Trial Dec. 31

BOSTON, Dec. 8—Massachusetts motorists were notified officially this week that as a matter of law all gasoline in the tanks of their motor vehicles on Dec. 31 was taxable at two cents a gallon under the new gasoline tax that goes into effect on January 1. But there was this compensation—Tax Commissioner Henry F. Long stated that inasmuch as it would cost too much to try to collect this tax the state would not bother with it, but if there are any motorists who felt a moral obligation to obey the law their taxes will be accepted.

Maryland Proposes Insurance Substitute

BALTIMORE, Dec. 12—A substitute plan for compulsory automobile liability insurance which is attracting great attention has been suggested by H. M. Lucius, secretary of the Automobile Club of Maryland. It has been placed before the general counsel of the American Automobile Association.

Mr. Lucius suggests a law requiring all operators and those making application agree to hold himself financially responsible up to $2,500 to pay any damages not exceeding $500 to property or $2,000 personal injury or death.

"At the same time," said Mr. Lucius, "write in the Motor Vehicle Law a clause that any operator meeting with an accident in which he is wholly responsible and has not fulfilled his promise in the application for a license to operate by being able to pay any judgments awarded against him in a law court up to the sum of $500 for property damage and/ or $2,000 for personal injury or death, shall automatically lose his license to operate for the rest of his natural life, unless he, within a period of 90 days after the judgment is awarded, can pay damages up to the amount stipulated in the law. If he can, he may be reinstated.

Accept N. H. Ruling

CONCORD, N. H., Dec. 8—Out of the state insurance companies writing automobile insurance in New Hampshire have definitely accepted the terms of Insurance Commissioner John A. Sullivan, who fought their increases in rates successfully this year. By the terms of the settlement the insurance companies will return to policy holders some $60,000 taken in increased premiums; the old rates will be put into effect, and there will be no attempt to increase rates again without the approval of the commissioner.

Green Says Engineers Neglect Transmission

Declares Substitution of Gasoline Electric Motive Power Not Yet Successful

NEW YORK, Dec. 8—Criticizing the transmission of automobiles as the most barbaric piece of mechanism remaining in cars, Colonel George A. Green, vice-president of the Yellow Truck & Coach Mfg. Co., told the joint meeting of the Society of Automotive Engineers and the American Electric Railway Association last night that this is one feature of the automobile which has been neglected by engineers. Such a unit can never be omitted from bus construction, he said.

Motor bus transportation was the theme of the evening's discussion and Colonel Green pointed out that although bus transportation systems have grown in mileage to exceed the railroads the performance of bus or coach can never be brought to equal that of the ordinary motor car. Substitution of gasoline electric motive power in buses has not yet been successful chiefly because of the cost of production and running, he pointed out.

R. N. Graham of Youngstown, Ohio, spoke on fitting the bus to transportation needs, and Adrian Hughes, Jr., superintendent of bus transportation of the United Railways & Electric Co., of Baltimore, spoke on practical bus maintenance factors and systems that constitute efficient service.

Pressed Metal Institute to Hold Detroit Sessions

BUFFALO, Dec. 10—The December meeting of the Pressed Metal Institute will be held in General Motors Building, Detroit, Dec. 19. The morning sessions will consist of group meetings, the light stampings group and heavy stampings group meeting separately, while at the afternoon session both groups will meet as the Pressed Metal Institute.

At 6.30 there will be a dinner, the members of the Pressed Metal Institute meeting as the guests of the Purchasing Agents' Association of Detroit. Following the dinner there will be an address by W. W. Galbreath, president of the Youngstown Pressed Steel Co., also president of the Pressed Metal Institute. Mr. Galbreath's subject will be "Today's Problems and Today's Purchasing Agent."

General Aero Acquires 4 Producing Companies

NEW YORK, Dec. 7—General Aero Corp. has been organized as a holding and operating company for Swallow Airplane Co. and the Cessna Airplane Co., both of Wichita, Kan. According to the announcement a propeller and engine company have also come under the control of the new corporation.

Detroit Car Sales Increase to 79,541

November Registrations of 4644 Bring Rise of 29,241 Over 1927

DETROIT, Dec. 8—A total of 4644 passenger cars were sold in Wayne County in November. This brings the total for the first 11 months to 79,541 compared with 50,300 in the crresponding period last year. November commercial car registrations totaled 452, bringing registrations to 5863 in the first 11 months, compared with 4781 in corresponding period last year.

Ford led the November passenger car registrations with 1599, bringing the total for the first 11 months to 11,133, compared with 3375 in the corresponding period last year. Chevrolet delivered 344 cars in November, bringing the total for the first 11 months to 14,949, compared with 10,473 in the corresponding period last year. Pontiac registered 330 cars, Essex 313, Buick 268, Oakland 238, Whippet 115, and Plymouth 113 in November.

Ford delivered 267 commercial units in November, bringing the total to 1926, compared with 1335 in the corresponding period of last year. Chevrolet delivered 75 in November and the 11 months' total is 1836, compared with 1427 last year. Graham Brothers delivered 17 in November, GMC 16, Reo 13 and International 10. Total truck sales for the first 11 months are 5863, compared with 4781 in the corresponding period last year.

Louisville Sales Up 39.6%

LOUISVILLE, KY., Dec. 8—Sales of passenger cars in Louisville during November showed the largest increase of any month of the year on a percentage basis, an increase of 109.2 per cent, on sales of 657 cars, as against 314 cars sold in November, 1927. For the year the increase is 39.6 per cent on 9049 cars sold, as against 6483 cars sold last year in the same 11 months.

By cars the sales showed Auburn, 3; Buick, 13; Cadillac, 8; Chandler, 8; Chevrolet, 99; Chrysler, 20; De Soto, 14; Dodge, 22; Durant, 10; Erskine, 6; Essex, 22; Ford, 266; Graham-Paige, 18; Hudson, 1; Hupmobile, 9; LaSalle, 2; Lincoln, 3; Marmon, 2; Nash, 15; Oakland, 8; Oldsmobile, 12; Packard, 9; Pierce-Arrow, 2; Pontiac, 35; Reo, 6; Rolls Royce, 1; Studebaker, 9; Stutz, 1; Whippet, 27; and Willys-Knight, 6.

Cincinnati Sales Exceed '27

CINCINNATI, Dec. 11—Although sales of new and used cars in November showed a decline as compared with October, registrations for the month just closed show a 50 per cent gain in new car sales over November, 1927, and a slight increase in the sale of used cars. Total figures for the first 11 months in 1928 are brought above those for the entire year of 1927. New car registrations for the first 11 months were 19,065 and used car sales 57,134 as compared with a total for last year of 18,210 and 56,348, respectively. November new car sales showed a 12 per cent decrease as compared with October.

Assistant to F. E.

Bert Dingley, service manager at Stutz, who has been named assistant to F. E. Moskovics, president

New York Sales 9104

NEW YORK, Dec. 10—New car sales in metropolitan New York in November totaled 9104 as against 11,098 in October and 5761 in November last year. Sales in the first eleven months totaled 141,730 as against 111,425 in the 11 months of 1927.

Wilson Names Directors of Great Lakes Aircraft

CHICAGO, Dec. 8—Nationally known business men and attorneys have been placed on the board of directors of the Great Lakes Aircraft Corp. of Cleveland, which recently took over the Glenn L. Martin aircraft properties, according to William Robert Wilson, chairman of the board.

Members are N. H. Van Sicklen, Jr., of A. B. Leach & Co.; Charles Dawes of Dawes & Co.; Col. B. F. Castle, New York capitalist; George Mason, president of Copeland Products, Inc.; C. H. Poppenheusen, Chicago attorney; E. R. Naar, Chicago capitalist; H. C. Bulkley, Detroit attorney, and Harry C. Watts, president of Harry C. Watts & Co.

Westinghouse Lowers Lamp Prices

PITTSBURGH, Dec. 12— A. E. Allen, vice-president of the Westinghouse Lamp Co., has announced a price change affecting two types of flashlight miniature Mazda lamps and six types of automobile lamps, representing approximately 33 1/3 per cent of the total miniature lamp demand.

Kentucky Increases Ratings on Trucks

State Tax Commission Holds That Manufacturers Reduce Rates One-Half

LOUISVILLE, KY., Dec. 8—Motor truck dealers of Louisville and Kentucky as well as owners are stirred by announcement of W. G. Stiglitz, county clerk, Louisville, that he had received orders to increase the capacity as rated by manufacturers on all trucks now listed at from one and one-half tons upward.

In the order from the State Tax Commission it was stated that the body had information that all trucks of over 1 ton are rated by their manufacturers at about one-half their capacity. The increases set by the commission are from one-half ton on the ton and a half, to four tons on the eight-ton truck, and the increased costs to owners range from $15 to $120 per truck.

The ruling meant that about 300 owners who had already secured licenses for next year would have to pay additional fees. There are about 8700 trucks listed in the county, most of which are half-ton and ton trucks, which are not affected.

H. C. Kelting, secretary of the Motor Truck Club of Kentucky, a joint organization of dealers and users, said the club would endeavor to have the commission rescind its ruling, as no other state has questioned the capacities rated by manufacturers. It is contended that the only standard is that established by the manufacturers, and that the overload capacity has no real bearing on the subject.

Under the announced plan rating and rates will advance:

1½	to 2	ton from	$ 55	to	$ 70
2	to 3	ton from	70	to	95
2½	to 3½	ton from	85	to	125
3	to 4	ton from	95	to	150
3½	to 5	ton from	125	to	250
4	to 6	ton from	150	to	330
4½	to 6½	ton from	185	to	360
5	to 7½	ton from	250	to	390
6	to 9	ton from	330	to	420
6½	to 9½	ton from	360	to	450
7	to 10½	ton from	360	to	480
7½	to 11	ton from	390	to	480
8	to 12	ton from	390	to	510

$2,000,000 Parts Plant Completed by Chevrolet

DETROIT, Dec. 8—The $2,000,000 small parts plant of Chevrolet Motor Co., now nearing completion at Bay City, was thrown open last week. The new plant, built on the site of the former Chevrolet buildings, is 900 ft. in length, 250 ft. wide and one story high, with the exception of the office, which is two stories. The plant manufactures 35 different parts that go into the manufacture of Chevrolet cars. Among the chief products are 5000 carburetors and 4000 fuel pumps per day. About 18,000 tons of steel are used daily.

Ford Stockholders Get $3,000,000 Refund

DETROIT, Dec. 8—Former stockholders of Ford Motor Co. have received refunds, approximating $3,000,000, as a result of the recent decision of the Board of Tax Appeals, on action brought by the Treasury Department seeking to collect approximately $35,000,000 extra assessments. United States Senator James Couzens has been offered a check for $989,883 as his part of the refund. Assuming that the refunds to other stockholders are on the same basis, the total amount paid out by the Treasury to close the case will approximate $3,000,000. The Treasury Department refused to disclose the amount of refunds made.

The position of the Treasury, taken when the suit was instituted a few days before the five-year statute of limitations had run in 1925, was that the value of the Ford stock as of March 1, 1913, had been grossly overestimated in determining the tax due on the sale of this stock to Henry and Edsel Ford in 1919. Instead of approximately $9,000 a share, the price fixed by the Treasury officials in 1919 as the value of the stock in 1913, the present Treasury administration held that it was worth only about $2,500 a share at that time.

The Board of Tax Appeals instead of confirming the Treasury view held that the stock actually was worth $10,000 a share in 1913, and it is in conformity with this decision that the Treasury now is making large refunds to the stockholders.

A decision of the United States Court of Appeals, rendered since the tax board's ruling, declared that there was no warrant in law for making the additional tax demand, at the time it was made, in any event.

Valentine Forms Aero Division

NEW YORK, Dec. 11—Valentine & Co., manufacturer of Valspar and other aircraft finishing materials, has inaugurated an aeronautical department, headed by Langdon B. Valentine, vice-president. A. Irving Boyer, Jr., formerly with the British R. F. C., will be special representative. The new aeronautical department will specialize on complete service to manufacturers.

Coming Feature Issue of Chilton Class Journal Publications

Feb. 23—Statistical Issue Automotive Industries.

Paris 1929 Show Opening Changed to October 3

PARIS, Dec. 8—Thursday, Oct. 3, has been fixed as the opening date of next year's Paris automobile show. In all probability the exhibition will remain open 10 days. No decision has yet been taken regarding the holding of three separate shows for respectively passenger cars, motorcycles and trucks, as was done this year. The organizing committee is not expected to meet to discuss this matter for several weeks. Next year's Paris show will not clash with the English exhibition, as was the case this year, for the British management has announced the display at Olympia for Oct. 17 to 26.

Non-Shatterable Glass Now on 30 Car Lines

NEW YORK, Dec. 7—Thirty makes of cars now have non-shatterable glass in windshields or windows, according to the Triplex Safety Glass Co. The prominence given to non-shatterable glass is plainly evidenced in the salon this year in the opinion of this company. Among the body builders in the salon using non-shatterable glass are the following: Brewster, Brunn, Derham, Dietrich, Fleetwood, Holbrook, Judkins, Le Baron, Locke, Rollston, Weymann and Willougby.

Coddington Leaves $500,000

CHARLOTTE, N. C., Dec. 10—The entire estate of C. C. Coddington, of this city, millionaire distributor of Buick automobiles, head of C. C. Coddington, Inc., was left in trust of the Union National Bank, of this city, to be shared equally by his three sons when the youngest becomes of legal age, about 10 years hence. The will was filed for probate here, and the executor-bank filed an estimate that his personal property was valued at $500,000.

Battery Committees Advance New Plans

NEW YORK, Dec. 10—Considerable progress has been reported by the various committees of the National Battery Manufacturers Association since its annual meeting in Atlantic City some time ago. The cost committee working on a uniform cost system had a two days' meeting in Buffalo last month and will meet again in Niagara Falls this week.

The technical committee also met in Buffalo last month and the members are now engaged in starting performance tests with the idea of formulating a standard cold test similar to the present 80 degrees Fahrenheit test of the Society of Automotive Engineers. In order to duplicate conditions of winter driving as much as possible this committee decided to run these tests at 10 degrees Fahrenheit which was found by Weather Bureau Statistics to be the average low point for the United States.

A special committee appointed to consider feasibility of publishing data sheets giving battery specifications on various cars is meeting Friday.

The traffic committee has reported the cancellation of an order in the Eastern Trunk Line territory revising the minimum carload from 40,000 to 30,000 lb. for batteries.

Federal Screw Expands

DETROIT, Dec. 8—Directors of the Federal Screw Works have declared the regular quarterly dividend of 43¾ cents on the outstanding capital stock, payable Jan. 2, 1929, to stockholders of record Dec. 20, 1928. The company also announces completion of its expansion program, providing for a 50 per cent increase in production at present full-time schedules. New business booked promises capacity operations for practically the entire year 1929.

Ajax Guarantees Line

NEW YORK, Dec. 10—Ajax Rubber Co., Inc., is introducing a new line of tires known as the "Ajax Gold Bond Balloon," with which goes a sweeping warranty for 18 months in writing against blow-outs, cuts, bruises, wheels out of alignment, underinflation, accidents and any other road hazards.

Calendar of Coming Events

SHOWS

All-American Aircraft Show, Detroit Board of Commerce, Detroit..Apr. 6-14
American Road Builders Association, Inc., Cleveland Auditorium..Jan. 14-18
Amsterdam Automobile Show....Jan. 11-20
Automobile Salon, Inc., Hotel Drake, Chicago .....Jan. 26-Feb. 2
Automobile Salon, Inc., Hotel Biltmore, Los Angeles.....Feb. 9-16
Automobile Salon, Inc., Palace Hotel, San Francisco .....Feb. 23-Mar. 2
Boston, Mass., Mechanics Bldg...March 2-9
*Chicago, National, Coliseum, Jan. 26-Feb. 2
Geneva Automobile Show .....Mar. 15-24
Leipzig, Germany, Fair.....Mar. 3-13
Melbourne Automobile Show.....May 2-11
*New York, National, Grand Central Palace .....Jan. 5-12
Rome Automobile Show.....Jan. 30-Feb. 16
Western States Metal and Machinery Exposition, Los Angeles.....Jan. 14-18

* Will have special shop equipment exhibit.

CONVENTIONS

American Road Builders Ass'n, Inc., Cleveland Auditorium.....Jan. 14-18
American Society for Steel Treating, Semi-Annual Meeting, Los Angeles .....Jan. 14-18
Chicago Power Exhibition and Conference, Coliseum, Chicago....Feb. 12-16
Manufacturers & Distributors of Motor Truck Equipment, Cleveland, Ohio .....Jan. 15
National Automobile Dealers Association, Palmer House, Chicago..Jan. 28-29
National Metal Congress, Los Angeles .....Jan. 14-18

S. A. E.

National

Detroit, Book-Cadillac, Jan. 15-18—Annual.
New York, Hotel Astor, Jan. 10—Annual Dinner.

Sectional

Indiana-Dayton .....Dec. 15

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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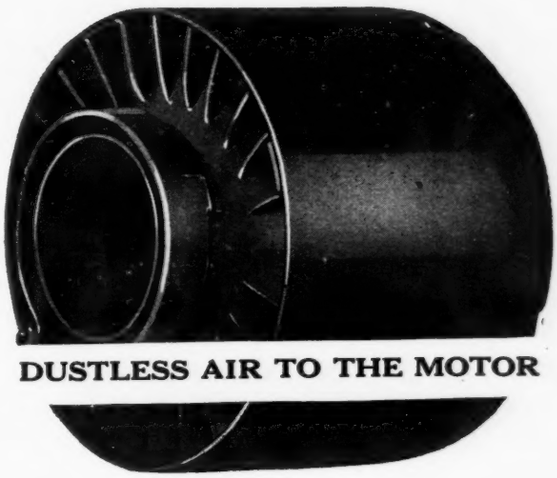
Protection!



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